

Central Radio Propagation Laboratory

# IONOSPHERIC PREDICTIONS

*for  
February  
1965*

TB 11-499-23/TO 31-3-28



U.S. DEPARTMENT of COMMERCE  
National Bureau of Standards  
Number 23/Issued November 1964

## U.S. DEPARTMENT OF COMMERCE

Luther H. Hodges, Secretary

## NATIONAL BUREAU OF STANDARDS

A. V. Astin, Director

Central Radio Propagation Laboratory

# Ionospheric Predictions

for February 1965

[Formerly "Basic Radio Propagation Predictions," CRPL Series D.]

Number 23

Issued

November 1964

The CRPL Ionospheric Predictions are issued monthly as an aid in determining the best sky-wave frequencies over any transmission path, at any time of day, for average conditions for the month. Issued three months in advance, each issue provides tables

of numerical coefficients that define the functions describing the predicted worldwide distribution of foF2 and M(3000)F2 and maps for each even hour of universal time of MUF(Zero)F2 and MUF(4000)F2.

NOTE: Department of Defense personnel see back cover.

Use of funds for printing this publication approved by the Director of the Bureau of the Budget (June 19, 1961).

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## National Bureau of Standards

The functions of the National Bureau of Standards are set forth in an Act of Congress, March 3, 1901, as amended. These include the development and maintenance of the national standards of measurement and the provision of means and methods for making measurements consistent with these standards; the determination of physical constants and properties of materials; the development of methods and instruments for testing materials, devices, and structures; advisory services to government agencies on scientific and tech-

nical problems; invention and development of devices to serve special needs of the Government; and the development of standard practices, codes, and specifications. The work includes basic and applied research, development, engineering, instrumentation, testing, evaluation, calibration services, and various consultation and information services. The Bureau also serves as the Federal technical research center in a number of specialized fields.

## Central Radio Propagation Laboratory

The Central Radio Propagation Laboratory at Boulder, Colorado, is the central agency of the Federal Government for the collection, analysis, and dissemination of information on propagation of radio waves at all frequencies along the surface of the earth, in the atmosphere, and in space, and performs scientific studies looking toward new techniques for the efficient use and conservation of the radio spectrum. To carry out this responsibility, the CRPL—

1. Acts as the central agency for the conduct of basic research on the nature of radio waves, the pertinent properties of the media through which radio waves are transmitted, the interaction of radio waves with those media, and on the nature of radio noise and interference effects. This includes compilation of reports by other foreign and domestic agencies conducting research in this field and furnishing advice to government and nongovernment groups conducting propagation research.

2. Performs studies of specific radio propagation mechanisms and performs scientific studies looking

toward the development of techniques for efficient use and conservation of the radiofrequency spectrum as part of its regular program or as requested by other government agencies. In an advisory capacity, coordinates studies in this area undertaken by other government agencies.

3. Furnishes advisory and consultative service on radio wave propagation, on radiofrequency utilization, and on radio systems problems to other organizations within the United States, public and private.

4. Prepares and issues predictions of radio wave propagation and noise conditions and warnings of disturbances in these conditions.

5. Acts as a central repository for data, reports, and information in the field of radio wave propagation.

6. Performs scientific liaison and exchanges data and information with other countries to advance knowledge of radio wave propagation and interference phenomena and spectrum conservation techniques, including that liaison required by international responsibilities and agreements.

## Introduction

The "Central Radio Propagation Laboratory Ionospheric Predictions" is the successor to the former "Basic Radio Propagation Predictions," CRPL Series D. To make effective use of these predictions, National Bureau of Standards Handbook 90, "Handbook for CRPL Ionospheric Predictions Based on Numerical Methods of Mapping," should be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, price 40 cents. This Handbook includes required additional data, nomographs and graphical aids, as well as methods for the use of the predictions. The Handbook supersedes the obsolete NBS Circular 465.

The basic prediction appears in tables 1 and 2, presenting predicted coefficients for foF2 and M(3000)F2 defining the numerical map functions describing the predicted worldwide variation of these characteristics. With additional auxiliary information, these coefficients may be used as input data for electronic computer programs solving specific high frequency propagation problems. The basic equations, their interpretation, and methods of using the numerical maps are described in two papers by W. B. Jones and R. M. Gallet, "The Representation of Diurnal and Geographic Variations of Ionospheric Data by Numerical Methods," Volume 66D, Number 4, July-August 1962, pages 419-438, and "Methods for Applying Numerical Maps of Ionospheric Characteristics," Volume 66D, Number 6, November-December 1962, pages 649-662, both in the Journal of Research of the National Bureau of Standards, Section D. Radio Propagation. The predicted numerical map coefficients of tables 1 and 2 may be purchased in the form of a tested set of punched cards. Write to the Prediction Services Section, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado, to arrange for the purchase of the set of punched cards and for further information and assistance in the application of computer methods and numerical prediction maps to specific propagation problems.

The graphical prediction maps, derived from the basic prediction, are provided for those unable to make use of an electronic computer. Figures 1 to 12 present world maps of MUF (Zero) F2 and MUF(4000)F2 for each even hour of universal time. Figures 13 to 16 present the same predictions for hours 00 and 12 universal time for the North and South Polar areas. Predicted polar maps for each even hour of universal time may be obtained by special arrangements with the Central Radio Propagation Laboratory. Handbook 90 describes methods for including regular E-F1 propagation. Figure A is a graph of predicted and observed Zürich sunspot numbers which shows the recent trend of solar activity. Table A lists observed and predicted Zürich smoothed relative sunspot numbers and includes the sunspot number used for the current prediction.

Members of the U.S. Army, Navy, or Air Force desiring the Handbook and the Ionospheric Predictions should send requests to the proper service address; for the Navy: The Director, Naval Communications, Department of the Navy, Washington, D.C., 20350; for the Air Force: Directorate of Command Control and Communications, Headquarters, United States Air Force, Washington, D.C., 20330. Attention: AFOCCAA. Army personnel should refer to the Handbook as TM-11-499 and to the monthly predictions as TB 11-499-( ), predictions for the month of February 1965 being distributed in November 1964 and designated TB 11-499-(23), and should requisition these through normal publication channels.

Information concerning the theory of radio wave propagation and such important problems as absorption, field intensity, lowest useful high frequencies, etc., is given in National Bureau of Standards Circular 462, "Ionospheric Radio Propagation." A revised work is in preparation which will be announced in the Ionospheric Prediction series when available. Additional information about radio noise may be found in C.C.I.R. Report Number 65, "Revision of Atmospheric Noise Data," International Telecommunication Union, Geneva, 1957.

Reports to this Laboratory of experience with these predictions would be appreciated. Correspondence should be addressed to the Prediction Services Section, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado.

NOTE: The MUF(ZERO)F2 values of figures 1A through 12A were derived by adding one-half the gyrofrequency to the foF2 calculated by use of the predicted coefficients in table 1. The error introduced by this approximation is generally not important compared to other uncertainties in the predictions, and is significant only when the foF2 is near or below the gyrofrequency. If more precise values of predicted fxF2 are desired, the theoretical relationships should be applied to the foF2 values calculated by the coefficients in table 1.

Table A  
Observed and Predicted Zurich Smoothed Relative  
Sunspot Numbers

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1954	6 (14)	6 (12)	4 (11)	3 (10)	4 (10)	4 (9)	5 (8)	7 (8)	8 (8)	8 (10)	10 (10)	12 (11)
1955	14 (12)	16 (14)	20 (14)	23 (13)	29 (16)	35 (18)	40 (22)	46 (27)	55 (30)	64 (31)	73 (35)	81 (42)
1956	89 (48)	98 (53)	109 (60)	119 (68)	127 (77)	137 (89)	146 (95)	150 (105)	151 (119)	156 (135)	160 (147)	164 (150)
1957	170 (150)	172 (150)	174 (150)	181 (150)	186 (150)	188 (150)	191 (150)	194 (150)	197 (150)	200 (150)	201 (150)	200 (150)
1958	199 (150)	201 (150)	201 (150)	197 (150)	191 (150)	187 (150)	185 (150)	185 (150)	184 (150)	182 (150)	181 (150)	180 (150)
1959	179 (150)	177 (150)	174 (150)	169 (150)	165 (146)	161 (143)	156 (141)	151 (142)	146 (141)	141 (139)	137 (137)	132 (137)
1960	129 (136)	125 (135)	122 (133)	120 (130)	117 (125)	114 (120)	109 (118)	102 (115)	98 (110)	93 (108)	88 (105)	84 (100)
1961	80 (100)	75 (90)	69 (90)	64 (90)	60 (85)	56 (85)	53 (80)	52 (75)	52 (70)	51 (70)	50 (65)	49 (60)
1962	45 (60)	42 (50)	40 (48)	39 (45)	39 (42)	38 (37)	37 (34)	35 (31)	33 (29)	31 (28)	30 (27)	30 (34)
1963	29 (31)	30 (28)	30 (26)	29 (25)	29 (25)	28 (25)	28 (23)	27 (21)	27 (20)	26 (18)	23 (18)	21 (17)
1964	19 (17)	17 (17)	(17)	(17)	(17)	(17)	(17)	(17)	(17.5)	(17.3)	(17.0)	(17.0)
1965	(15.0)(16.0)*											
1966												

Note: Final numbers are listed through June 1963, the succeeding values being based on provisional data. The predicted numbers are in parentheses.

\* Number used for predictions in this issue.



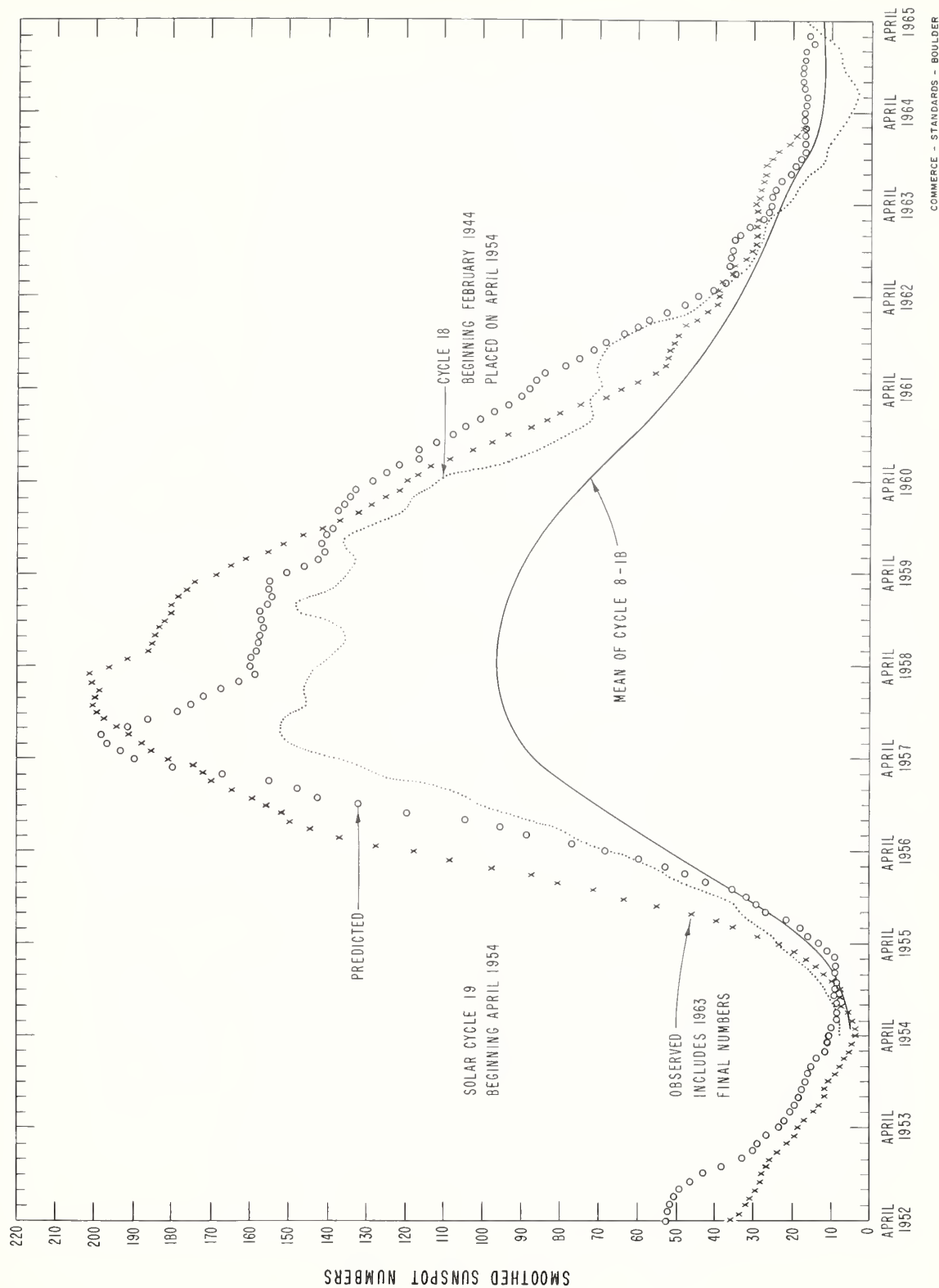


FIG. A. PREDICTED AND OBSERVED SUNSPOT NUMBERS

TABLE 1

## TIME VARIATION

Harmonic	O		I		2		3		4		5		6		7		8	
	K	S	K	S	K	S	K	S	K	S	K	S	K	S	K	S	K	S
I	0	6.9625507E 00	2.2677000E 00	1.7363102E 00	-6.1846817E -01	3.5803092E -01	-2.5626514E -01	-5.3731774E -01	-1.2717672E -01	1.4453981E -01	-2.22868791E -01							
	1	-1.9235179E 00	-9.4633120E -01	-4.6509184E -02	-2.6395174E -01	-9.3432982E -01	-1.4972954E 00	-6.9454316E -01	1.4453981E -01	1.4453981E -01	1.4453981E -01							
	2	-2.3331175E 00	-5.2875081E -01	1.2378144E -01	-5.7817978E -01	-5.8853066E 00	-1.5588702E 00	-2.3755076E 00	-1.0762288E 00	1.6676306E 00	-3.6912795E -01							
	3	1.6944438E 01	1.8427088E 01	2.5314072E 01	9.992413E 00	1.7134259E 01	1.3970236E 01	5.9901596E 00	-3.772467E 00	-9.973088E -01	-0.973088E -01							
	4	-7.8588280E 01	-2.7267018E 01	-8.4322031E 01	-2.7267018E 01	-4.5088105E 01	1.6599445E 01	-9.9717708E 01	1.0230551E 01	-1.0230551E 01	-0.973088E -01							
	5	-7.4019628E 02	-1.1068577E 02	-1.4441664E 02	-5.2630659E 01	-7.5879712E 01	-5.2311047E 01	-2.1038732E 01	1.8755032E 01	1.8755032E 01	1.8755032E 01							
	6	-2.7725998E 02	-1.5863668E 02	-2.1186582E 02	-1.3560663E 02	-1.3560663E 02	8.9311978E 01	3.4321562E 01	3.4321562E 01	3.4321562E 01	3.4321562E 01							
	7	-1.5079288E 02	-3.5800636E 02	-3.5800636E 02	-2.3690815E 01	-2.3690815E 01	1.3876500E 02	1.3876500E 02	1.3876500E 02	1.3876500E 02	1.3876500E 02							
	8	-1.4564213E 02	-2.5796994E 02	-2.9874278E 02	-2.3690815E 01	-2.3690815E 01	7.153270E 01	7.153270E 01	7.153270E 01	7.153270E 01	7.153270E 01							
	9	-1.1678344E 02	-2.3824084E 02	-1.5047570E 02	-1.0308818E 01	-1.0308818E 01	-6.9442089E 01	-2.7550773E 01	4.2234147E 01	4.2234147E 01	4.2234147E 01							
	10	-5.3638707E 02	-9.2689446E 02	-1.0339680E 02	-3.6237557E 01	-3.6237557E 01	2.0432496E 01	8.7908848E 01	1.5604771E 01	1.5604771E 01	1.5604771E 01							
	11	-8.8807456E 01	-6.4571270E 01	-3.4767321E 01	2.3355916E 01	2.3355916E 01	7.6293314E 00	-2.4065751E 01	-1.3307945E 01	-1.3307945E 01	-1.3307945E 01							
II	13	1.0441252E -01	2.0242069E -02	1.7326897E -01	8.4657589E -02	1.3579231E -01	6.0331252E -02	4.9890718E -02	-1.0047684E -01	1.7435331E -02								
	14	2.3532350E -02	-3.3617170E -02	-7.7319248E -02	1.0324585E 02	9.7647197E -02	-5.1865712E -01	1.7787258E -01	-5.5178903E -02	-2.8158362E -02								
	15	-2.7675775E -01	-2.5989040E 00	-5.9349303E 00	-4.0463245E 00	-1.1937772E 00	-1.7137461E 00	-1.101223E -01	2.6022701E -01	-2.8158362E -02								
	16	-1.0849666E -01	-1.4501885E 00	-1.0849133E 01	-2.9353225E 00	-3.3049094E 00	-1.6322133E 00	-2.0598589E 00	3.6412089E -01	-7.7145089E -01								
	17	4.9432087E 01	7.0704370E 00	-8.3613821E 00	-2.0416797E 00	-2.6177572E 00	-5.5007733E 00	-2.9737776E 00	4.0846786E 00	9.7274319E -01								
	18	1.4948817E 01	1.8163670E 01	4.4024086E 01	-1.1543058E 01	4.6683333E 00	4.3877909E 01	-5.5915989E 00	-4.5667399E 00	5.0540814E 00								
	19	8.9573151E 01	7.3651786E 01	9.1959016E 01	5.0214574E 01	1.4530122E 01	2.2034963E 01	1.2858264E 01	-1.9606591E 00	8.5642729E 00								
	20	-7.3588244E 00	-5.4903400E 01	7.5722462E 01	9.3233756E 01	1.8113760E 01	-6.1154935E 01	2.4709626E 01	-1.9297774E 01	1.2581944E 01								
	21	-1.5183238E 02	-8.3188175E 01	1.2192132E 02	4.6394213E 01	-3.8268960E 01	1.3017874E 01	2.1945743E 01	-4.0697370E 01	-1.3706432E 01								
	22	-1.2688235E 02	-1.0263097E 02	-7.2765297E 02	-2.1189587E 02	-5.1740826E 01	-1.0152467E 02	-6.486413E 01	2.2891993E 01	-2.7938828E 01								
	23	-4.8830791E 02	-3.9478222E 02	-4.1086618E 02	-3.8435977E 01	-5.1740826E 01	-8.9331529E 01	-1.1392472E 02	1.6319702E 01	-3.6412657E 01								
	24	4.4150253E 01	-3.3523506E 02	-5.6507550E 02	-7.2490999E 00	-5.6236418E 01	1.5992173E 02	-6.801474E 01	1.6319702E 01	-3.6412657E 01								
III	25	7.0668484E 02	6.5843853E 02	7.8152556E 02	4.0771705E 01	9.0884079E 01	2.1418396E 02	1.5190007E 02	-1.0920331E 01	7.1840119E 01								
	26	1.6852523E 02	6.5843853E 02	7.8152556E 02	4.0771705E 01	9.0884079E 01	2.1418396E 02	1.5190007E 02	-1.0920331E 01	7.1840119E 01								
	27	-7.6724205E 01	9.0038443E 02	2.6924553E 02	-1.5848012E 02	-2.11044984E 02	-2.6548488E 02	2.3906650E 02	-2.9922375E 02	-1.4338508E 02								
	28	-4.0707400E 02	-2.9478513E 02	3.0598187E 03	1.1168415E 03	1.1168415E 03	-2.1131907E 02	1.1096415E 02	-2.9922375E 02	-1.4338508E 02								
	29	-1.0787946E 03	-6.7391156E 02	-6.7409583E 02	9.1718433E 01	-9.4981319E 01	1.8718167E 00	3.6745158E 01	5.2947017E 01	-5.092312E 01								
	30	-4.6097588E 01	-3.9137944E 02	-1.7671010E 02	1.9366813E 01	-2.3437780E 02	2.1177654E 02	-1.6588259E 02	2.1631233E 01	-6.6762818E 01								
	31	1.3240441E 03	5.8898742E 02	-9.7913185E 02	8.5051764E 01	-5.1602387E 02	3.1038640E 02	-9.2078718E 02	2.1631233E 01	-6.6762818E 01								
	32	1.7195179E 02	1.2257609E 02	-1.7749379E 01	-3.7127284E 01	-3.3899050E 01	-1.8092845E 00	-6.2259962E 00	2.8360413E 02	1.3253498E 02								
	33	3.9148327E 02	2.5941787E 02	2.1587165E 02	1.1591312E 02	3.0167459E 01	-6.2259962E 00	6.7199784E 00	2.8360413E 02	1.3253498E 02								
	34	-5.5219997E 02	-3.8012795E 02	4.8638203E 02	-7.7566938E 01	-9.1586039E 01	-1.2771759E 02	8.3395010E 01	-8.8624388E 01	5.4284055E 01								
	35	-4.6374446E 02	-2.0981992E 02	3.1393237E 02	-1.54616837E 01	1.26040520E 01	6.2733459E 01	3.2443214E 01	-9.7387160E 01	-5.495138E 01								
IV	39	2.2484258E -01	1.1956597E -01	-1.9459080E -01	-1.3602455E -02	-3.0397159E -02	3.4490438E -03	4.5711382E -02	3.7940502E -03	-3.4252378E -02								
	40	6.7809924E -02	9.5121300E -02	1.9184781E -03	-2.3402284E -02	-3.0397159E -02	3.4490438E -03	4.5711382E -02	3.7940502E -03	-3.4252378E -02								
	41	1.0451126E -01	9.7265408E -01	-1.1340701E -03	-5.4368198E -01	-1.0165904E -01	-4.0640278E -01	-9.0278404E -02	1.5950059E -01	-1.7959089E -02								
	42	2.2754107E -01	-1.4726780E -01	-4.7037448E -01	-2.5101928E -01	-4.7180778E -02	-2.8228208E -02	-1.5338012E -03	-2.1844974E -02	3.1467114E -03								
	43	-5.5958073E -01	-1.1421852E -01	3.4199112E 00	-2.8022356E -01	1.5284976E 00	4.2778018E -03	-2.287377E -01	-4.3240026E -02	2.1860684E -02								
	44	-6.4098728E -01	-5.613284E -01	3.4013032E 00	-3.5782832E -02	1.1202225E 00	2.3416831E -02	-2.8238040E -02	-2.5187619E -02	2.0899564E -02								
	45	-1.8420244E 00	-1.9332107E 00	5.3990000E 00	2.414071E 00	1.2996356E -01	3.0734039E 00	-1.6767189E -02	-3.972805E -01	1.3548150E -01								
	46	5.2675213E -03	3.4387172E 00	3.4387172E 00	3.9952469E -02	1.563574E -01	1.6693555E -01	-3.4473920E -02	8.5773526E -03	-1.579461E -03								
	47	4.6299012E -01	-1.2471600E 01	-1.2471600E 01	4.3038274E -02	-3.216024E 00	-3.8420731E -01	-6.7587525E -03	3.3841567E -01	-3.3841567E -01								
	48	-2.9312440E -03	-5.2682878E 01	-5.2682878E 01	2.7738583E -01	-4.1748612E 00	-2.2214977E -03	1.6686656E -02	-2.7637916E -02	-2.7637916E -02								
	49	-5.9398870E -02	-4.6799444E 00	-4.6799444E 00	-8.6555122E -02	-2.1701429E -02	-5.0489748E -02	4.4864336E -02	-2.7474459E -02	-2.7474459E -02								
	50	2.3968637E -02	1.1347128E 01	1.1347128E 01	-8.6555122E -02	-2.1701429E -02	-5.0489748E -02	4.4864336E -02	-2.7474459E -02	-2.7474459E -02								
	51	-4.0550898E -01	1.1502148E 01	1.1502148E 01	3.5021349E 00	3.5021349E 00	-1.4460605E -01	3.2443214E 01	-9.7387160E 01	-5.495138E 01								

## GEOGRAPHICAL VARIATION

Harmonic	S		6		7		8	
	K	S	K	S	K	S	K	S
I	0	1.6072579E -01	1.6072579E -01	2.125064E -01	-1.0359448E -01	-6.2002204E -02	-7.3432118E -02	-5.2294317E -02
	1	1.9981179E -01	1.9981179E -01	2.6728414E -02	5.3096619E -02	1.2897425E -01	2.4141181E -02	-8.7005200E -02
	2	-3.4138118E -01	-3.4138118E -01	-3.9266753E -01	3.3471102E -01	-5.212014E -03	2.4449336E -01	1.5517100E -01
	3	-1.9652740E -01	-1.9652740E -01	-5.0710470E -02	-5.4363318E -02	-1.3580170E -01	-1.9623225E -02	3.9573935E -02
II	4	1.8454276E -01	1.8454276E -01	2.1212338E -01	-2.3190630E -01	-6.6363171E -02	-1.7104319E -01	-1.775738E -02
	5	1.6072579E -01	1.6072579E -01	2.125064E -01	-1.0359448E -01	-6.2002204E -02	-7.3432118E -02	-5.2294317E -02
	6	1.9981179E -01	1.9981179E -01	2.6728414E -02	5.3096619E -02	1.2897425E -01	2.4141181E -02	-8.7005200E -02
	7	-3.4138118E -01	-3.4138118E -01	-3.9266753E -01	3.3471102E -01	-5.212014E -03	2.4449336E -01	1.5517100E -01

TABLE 2

## TIME VARIATION

Harmonic	O		I		2		3		4		5		6	
	K	S	1		2		3		4		5		6	
I	0		2.9986122E 00	-1.5410095E-01	-2.5841120E-01	9.8143325E-03	-8.9451206E-02	3.0722092E-02	-7.8002039E-02					
	1		3.1214814E-01	-7.4422674E-03	-1.8151247E-01	2.2779464E-02	-5.9374158E-02	-1.4791825E-01	9.3306168E-02					
	2		2.0707089E 00	1.4109289E 00	2.6534348E 00	4.2193835E-02	-3.6973253E-01	-8.1694521E-01	3.4207805E-01					
	3		-5.7165673E-01	1.2113976E-01	1.6573172E 00	-1.4049520E-01	3.8983294E-01	6.0094771E-01	-4.6717830E-01					
	4		-6.9649935E 00	-3.81117827E 00	6.3280129E 00	-6.4251385E-01	1.5655961E 00	2.9800992E 00	-1.1639465E 00					
	5		3.0555992E-01	1.6211960E-01	-2.4465765E 00	2.6073764E-01	-4.3938416E-01	-9.1539804E-01	5.4228160E-01					
	6		8.6192908E 00	4.5685491E 00	6.4739854E 00	1.0837790E 00	1.8398465E 00	-3.9517477E 00	1.6314203E 00					
	7		-3.1370413E-03	8.0100929E-02	1.0370035E 00	-1.3702107E-01	1.5210565E-01	4.768330E-01	-1.6561355E-01					
II	8		-3.6066933E 00	-1.9998129E 00	-2.5049373E 00	-5.1241551E-01	7.3183763E-01	1.7726200E 00	-7.2764981E-01					
	9		-2.0646746E-02	-1.0386741E-02	4.8869496E-02	-1.9571973E-02	1.2259102E-02	5.0992921E-03	-3.9817994E-04					
	10		-1.1102366E-01	-2.5561647E-02	-4.8851352E-04	-1.2516871E-02	1.0935308E-02	5.4398736E-02	-2.0489878E-02					
	11		1.4457705E-01	-1.7848471E-01	9.1497059E-02	6.7140457E-02	1.1375167E-01	5.3410870E-02	-4.1519362E-03					
	12		4.4655030E-01	-5.0225319E-01	-9.9043825E-01	6.3414463E-02	-9.6221097E-03	2.1803250E-01	-4.1444803E-02					
	13		9.7524898E-02	-2.6237438E-01	-5.4210612E-01	1.1074337E-01	-5.3397769E-02	1.7285431E-02	2.5929011E-01					
	14		1.6631242E 00	7.4610705E-01	-5.2901913E-02	2.4674764E-01	-2.7069589E-01	-8.0884565E-01	6.1802704E-01					
	15		-9.8036365E-01	1.1959149E 00	8.6487288E-02	-5.5366591E-01	-5.8661858E-01	-4.300007E-01	-7.6704984E-02					
III	16		3.2277022E 00	3.0906564E 00	6.2583673E 00	-4.5061386E-01	-1.1543954E-01	-1.3534189E 00	6.9279619E-02					
	17		3.8501634E-01	1.8270296E 00	1.2919393E 00	-4.7766530E-01	3.163420E-01	-1.6650003E-02	-1.2723207E 00					
	18		-7.0779930E 00	-3.0342885E 00	2.7023537E-01	-1.5615396E 00	1.6731936E 00	3.3998104E 00	-2.5018970E 00					
	19		2.3298356E 00	-2.5638945E 00	-7.4438545E-01	1.0923854E 00	9.6810157E-01	9.1998105E-01	3.1713758E-01					
	20		-6.7220377E-01	-5.5574797E 00	-1.1048869E 01	1.0005540E 00	2.8237148E-01	2.3306587E 00	-4.3710651E-02					
	21		-7.4740527E-01	-3.5703300E 00	-7.1472180E-01	8.5597652E-01	1.1589774E 00	-4.9945999E-02	2.0369974E 00					
	22		1.0858074E 01	3.9490710E 00	-9.2226632E-01	3.0776586E 00	-3.2423585E 00	-4.9945084E 00	3.6316306E 00					
	23		-1.6357653E 00	1.4674883E 00	6.0084275E-01	-6.5782087E-01	-6.6988339E-01	-5.1497281E-01	-2.0931314E-01					
IV	24		4.2206675E 00	3.2008450E 00	6.2532346E 00	-6.4861527E-01	-1.7568407E-01	-1.2395082E 00	-2.5078785E-02					
	25		2.8886007E-01	2.2750728E 00	-1.5644759E-02	-4.7723343E-01	-8.7527574E-01	2.7145281E-02	-1.0828788E 00					
	26		-5.5072386E 00	-1.5833602E 00	6.5318507E-01	-1.8012360E 00	1.8906793E 00	2.3744182E 00	1.7064808E 00					
	27		-2.0345204E-02	-2.0345204E-02	-9.9059356E-04	6.2706560E-03	5.0322983E-03	2.2987380E-02	2.5953127E-04					
	28		-4.1288669E-03	-4.1288669E-03	-1.1470249E-02	4.0581255E-03	1.5020300E-02	1.4365699E-02	5.1591626E-04					
	29		-1.6941795E-01	-1.3407655E-01	-1.3407655E-01	2.9072545E-02	-2.9146361E-02	1.0286115E-02	-6.6866194E-05					
	30		-1.0446658E-02	-1.0062571E-01	-1.0062571E-01	7.4916596E-02	-0.901034E-02	-9.6117206E-02	8.3823503E-05					
V	31		3.8282689E-02	-1.4287411E-02	-1.4287411E-02	-1.6412974E-02	-1.4358500E-02	-1.5696941E-01	-1.7988081E-03					
	32		8.1265527E-02	-8.9634317E-02	-8.9634317E-02	1.1723958E-02	-1.8753524E-02	-3.4274018E-02	-3.4274018E-02					
	33		3.7936291E-01	2.4186609E-01	2.4186609E-01	-3.0900528E-02	4.7963506E-02	-1.1924507E-02	-6.7524889E-03					
	34			2.9600399E-01	2.9600399E-01	-1.5635757E-01	1.4744361E-01	1.9085293E-01						
	35			5.8742847E-01	5.8742847E-01		-1.1705960E-02							
	36													

## GEOGRAPHICAL VARIATION

Harmonic	4		5		6	
	K	S	9		10	
I	0		2.0243328E-02	2.9347649E-02	-1.8675685E-02	9.0735121E-03
	1		3.8535784E-02	-1.8219749E-03	6.1380888E-03	3.3650412E-02
	2		-2.3519906E-02	-3.5520358E-02	2.5737540E-02	-1.0195017E-02
	3		-3.5156840E-02			-2.9323944E-02

I - Main latitudinal variation. Mixed latitudinal and longitudinal variation: II - First order in longitude, III - Second order in longitude.  
 Notation: For each entry the number given by the first eight digits and sign is multiplied by the power of ten defined by the last two digits and sign.

PREDICTED COEFFICIENTS  $D_{SK}$  DEFINING THE FUNCTION  $I'(\lambda, \theta, t)$  FOR MONTHLY MEDIAN  $M(3000)F_2$   
 FEBRUARY 1965



FEBRUARY 1965 UT=00

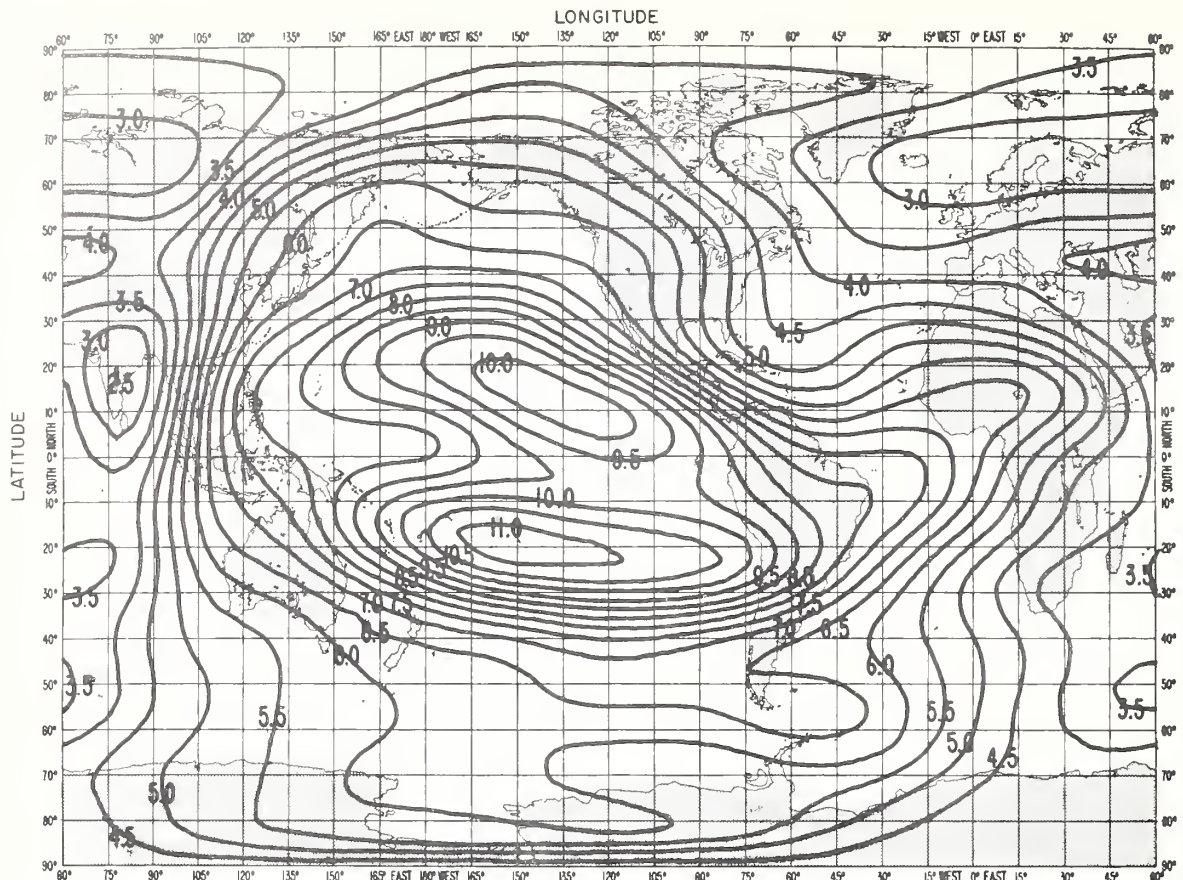


FIG. 1A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

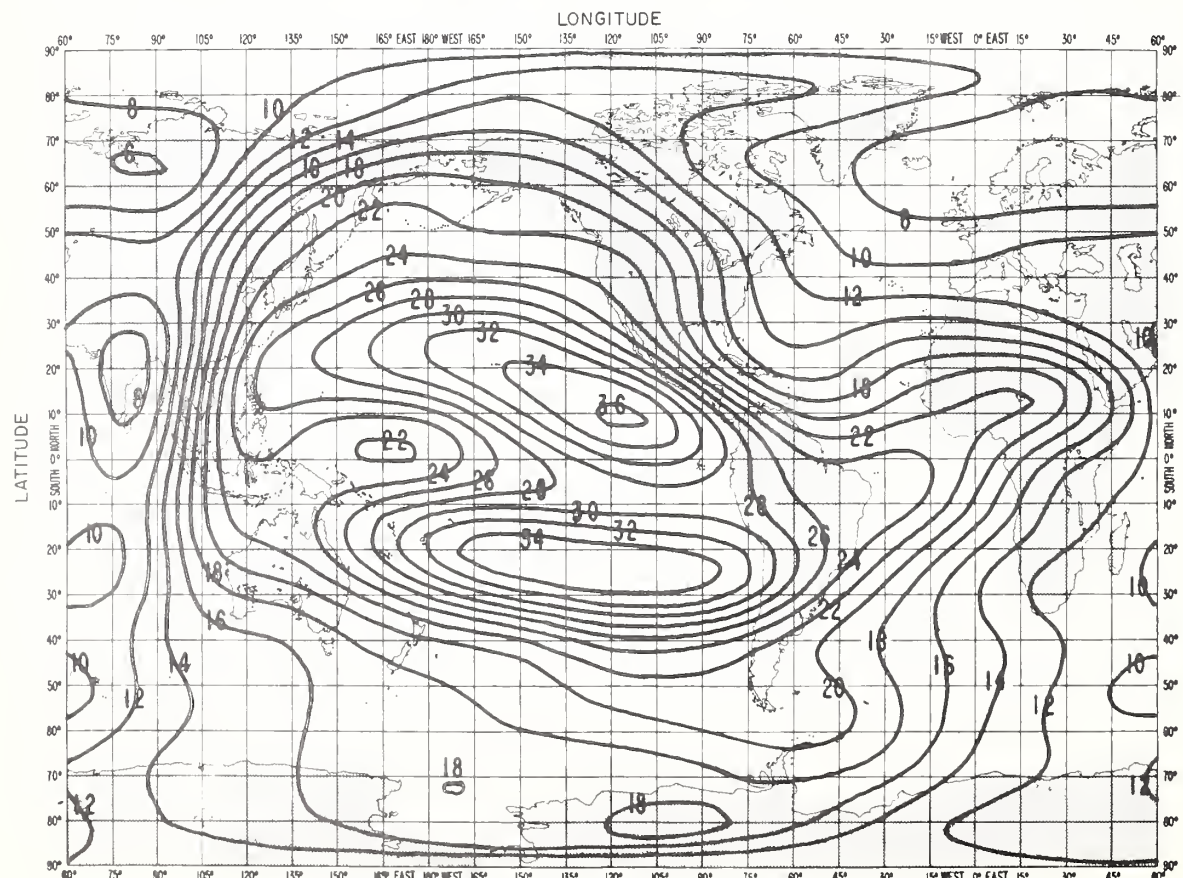


FIG. 1B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)



FEBRUARY 1965 UT=02

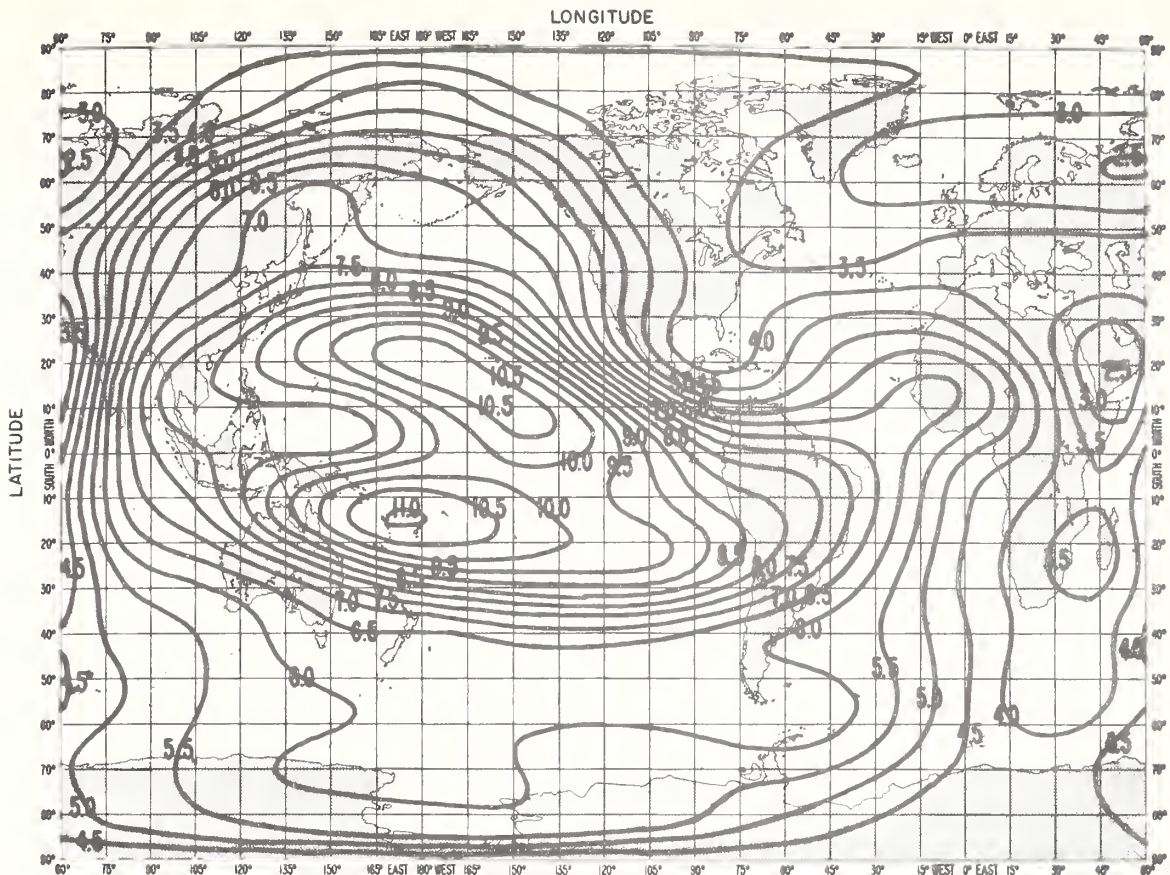


FIG. 2A. PREDICTED MEDIAN MUF(0)F2 (Mc/s)

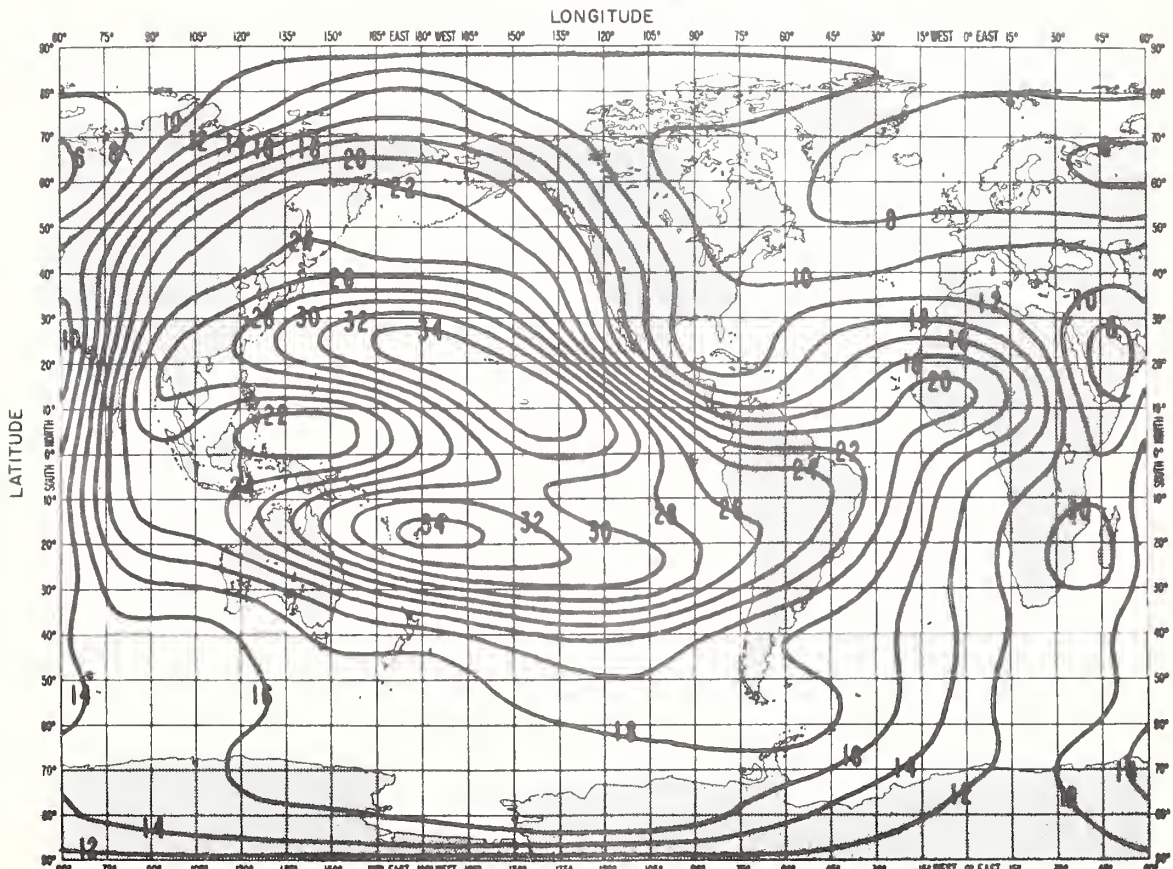


FIG. 2B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)



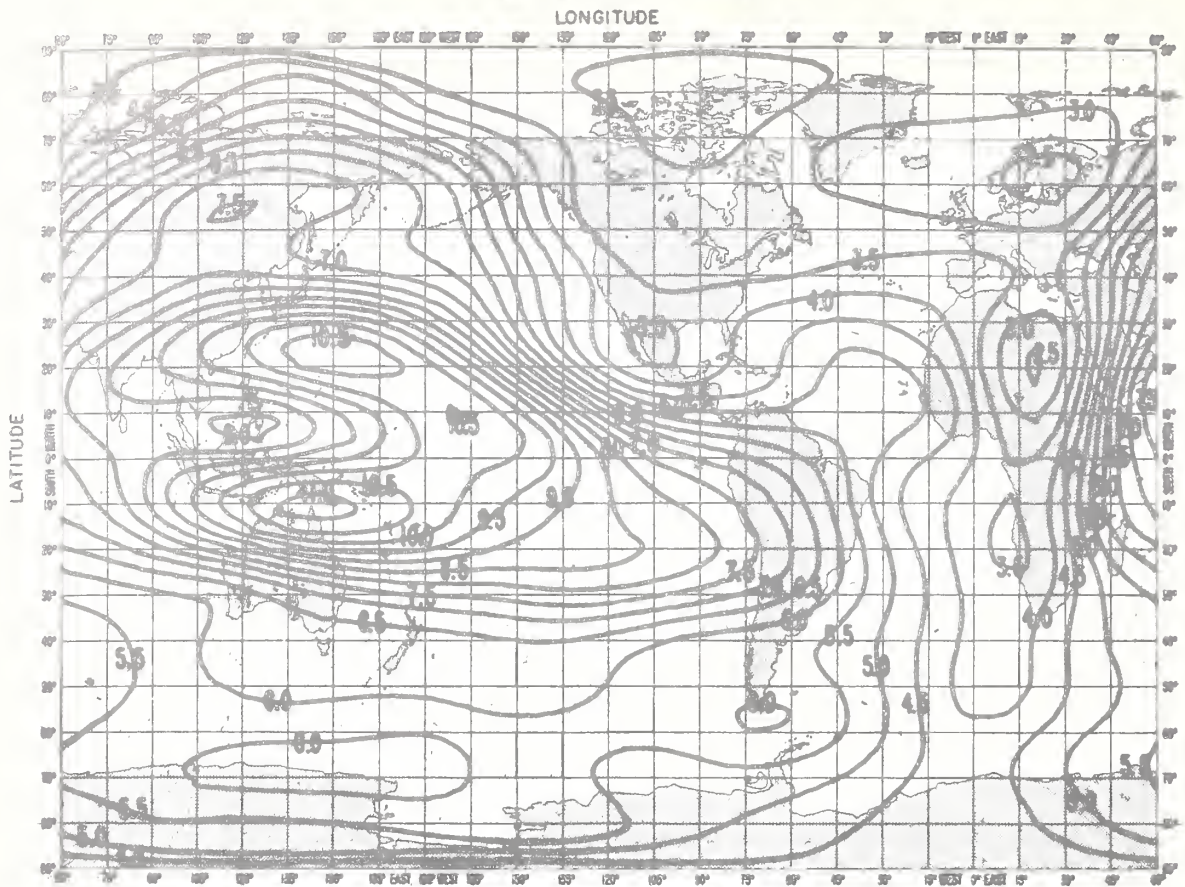


FIG. 3A. PREDICTED MEDIAN MUF(0)F2 (Mc/s)

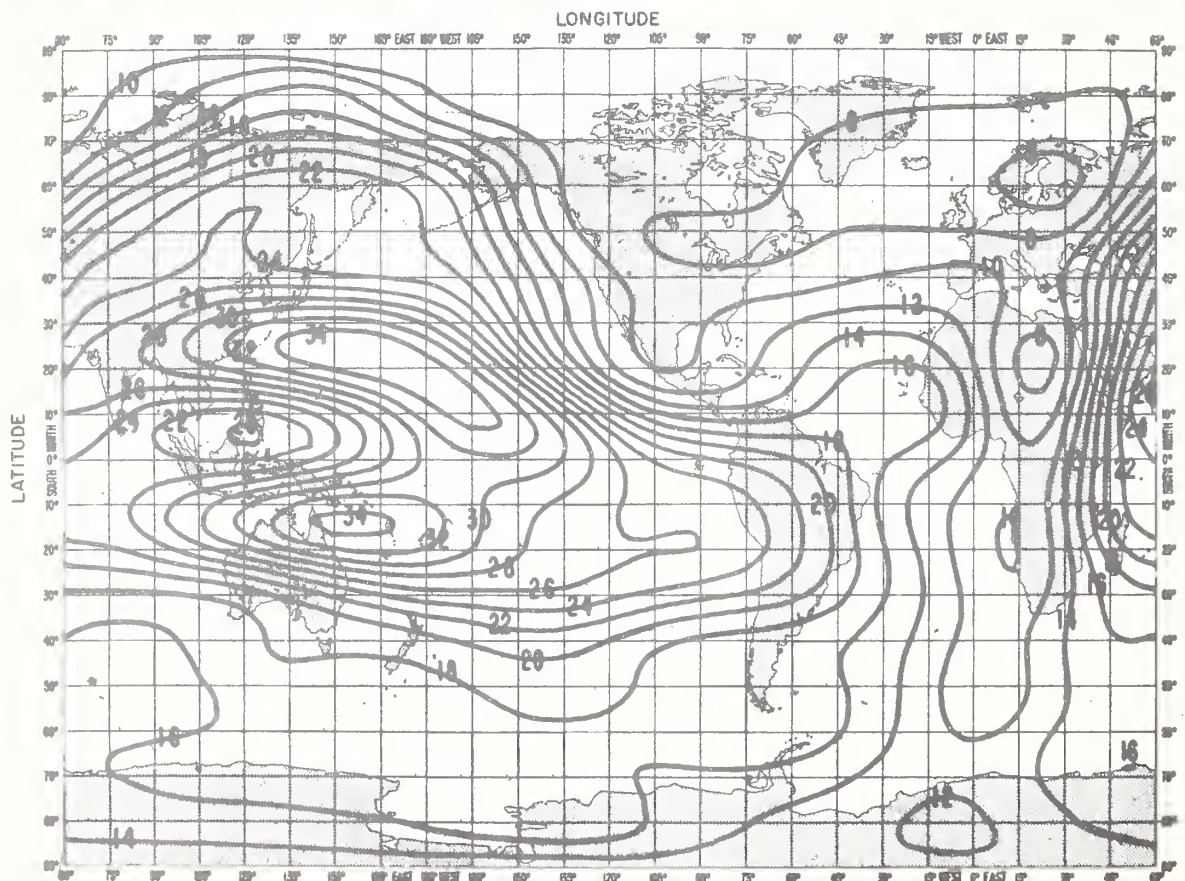


FIG. 3B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

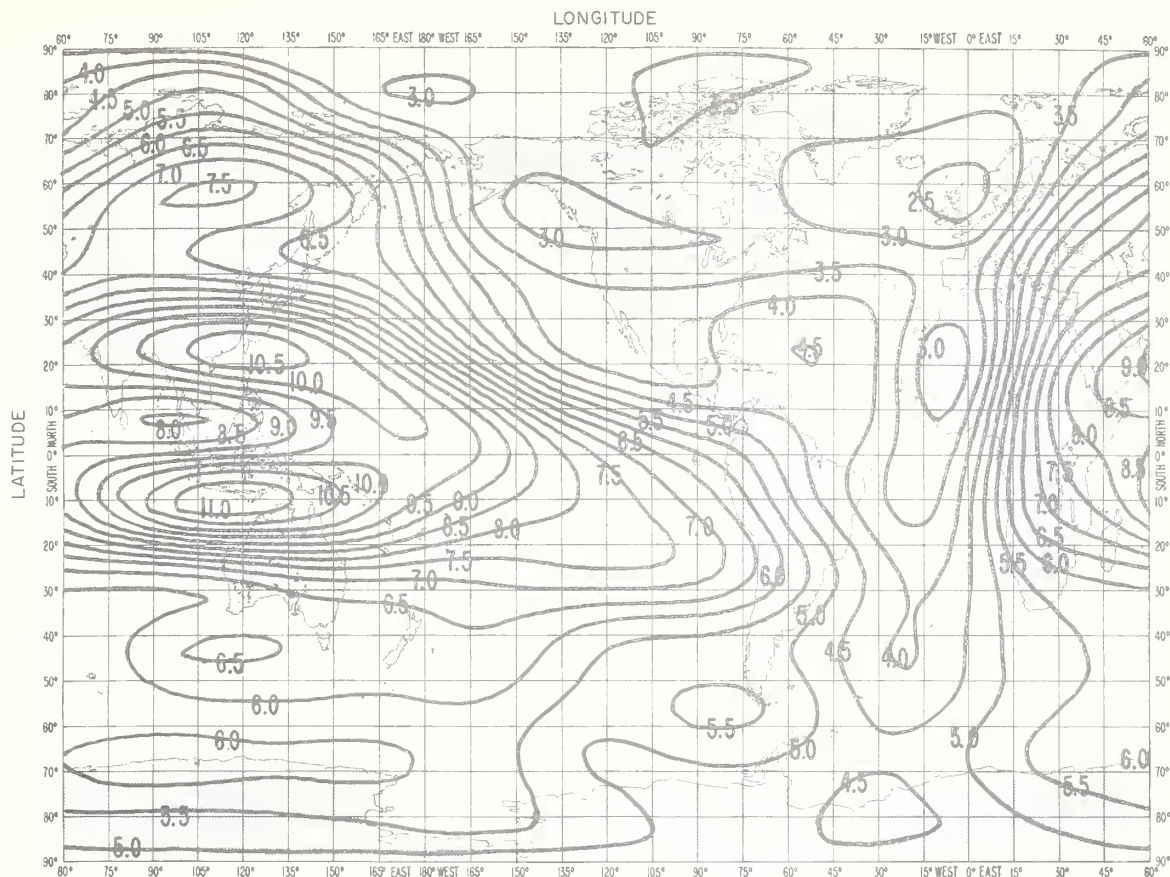


FIG. 4A. PREDICTED MEDIAN MUF(0)F2 (Mc/s)

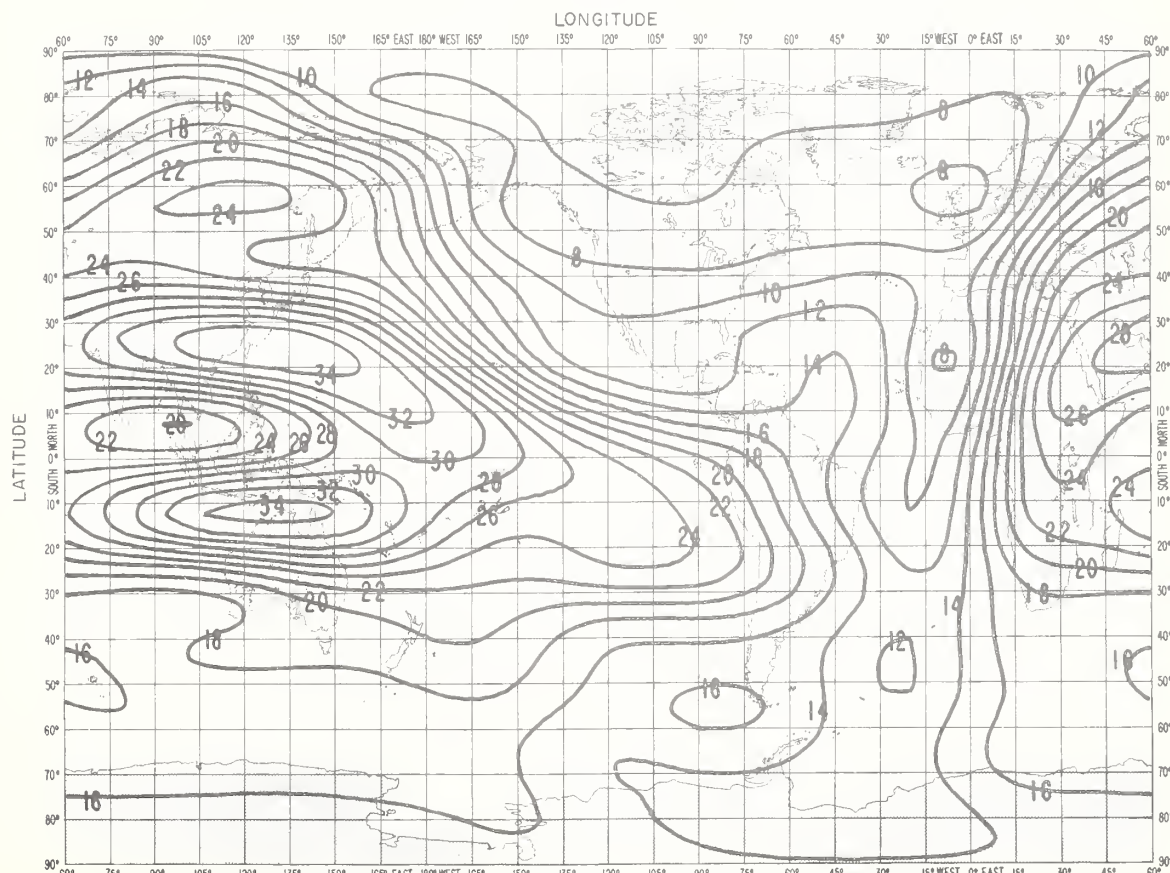


FIG. 4B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)



FEBRUARY 1965 UT=08

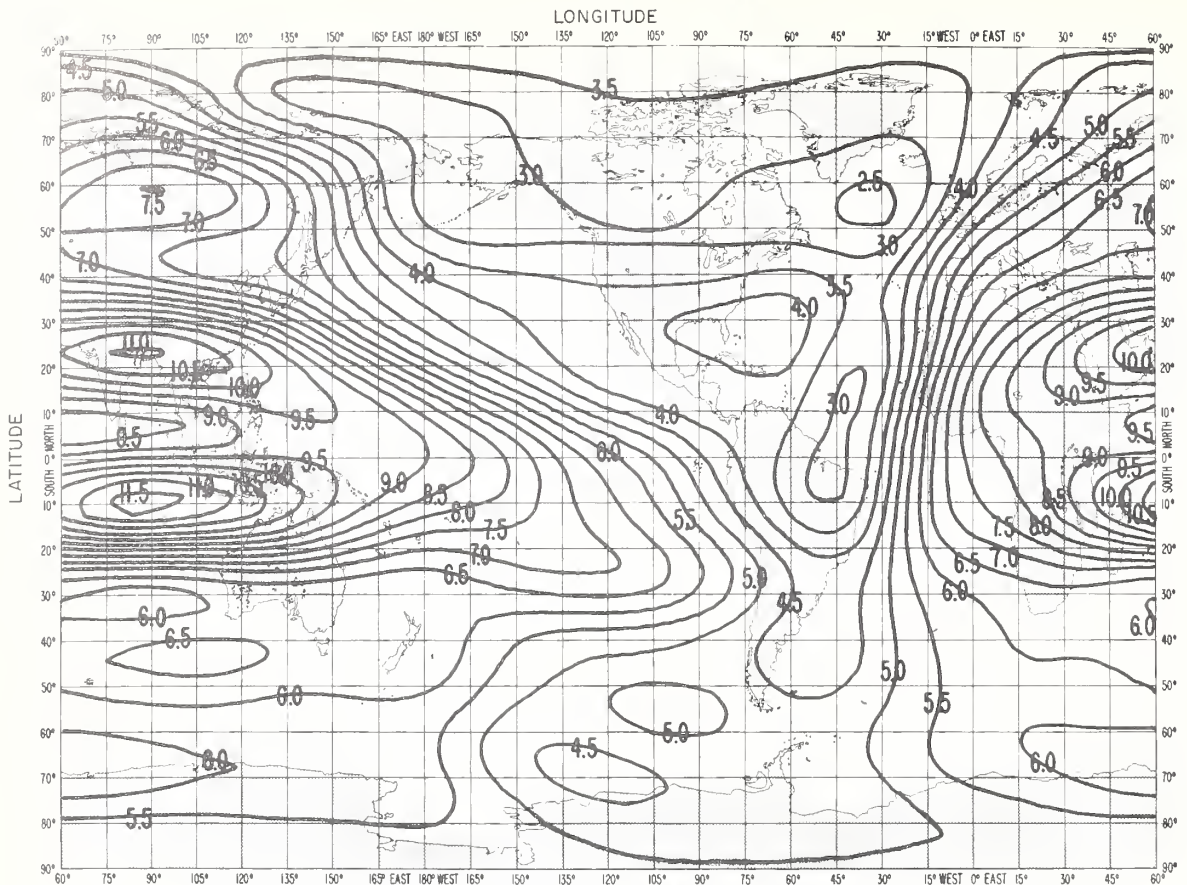


FIG. 5A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

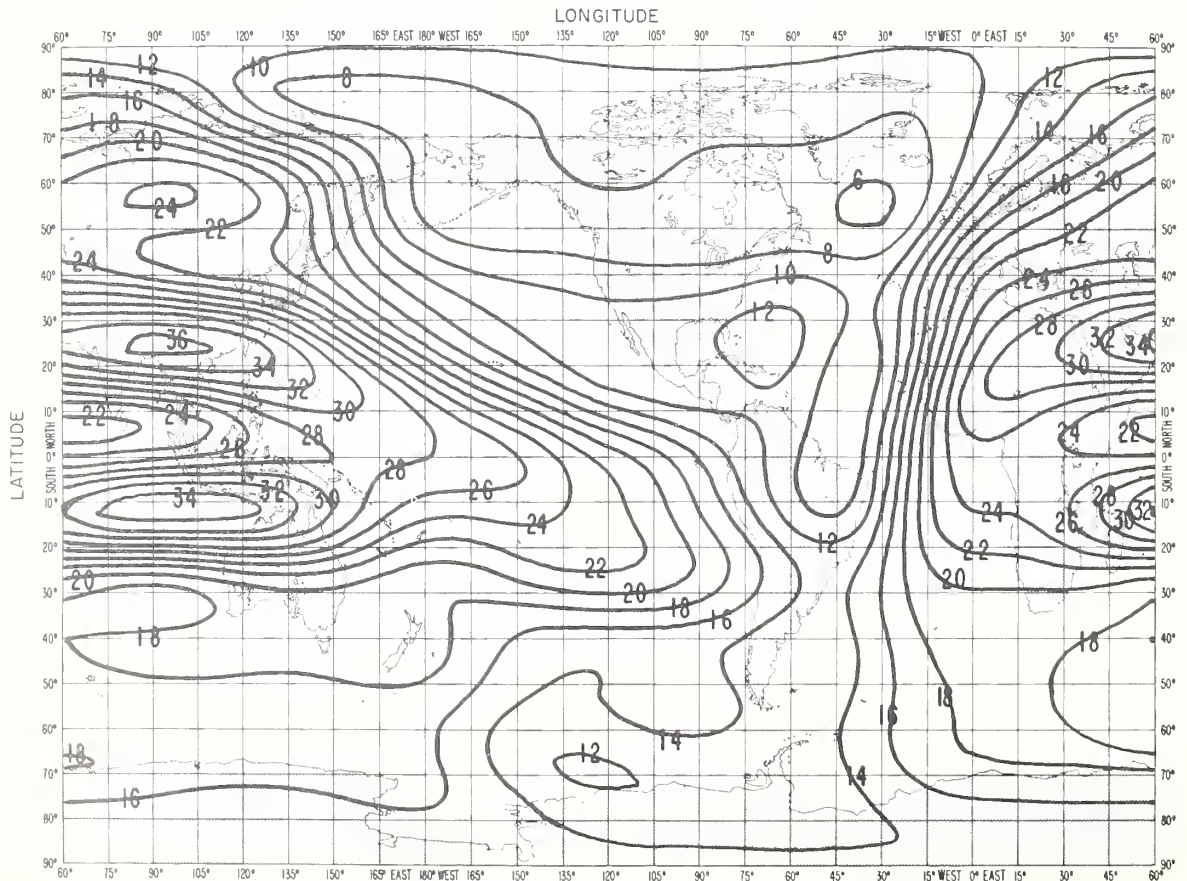


FIG. 5B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

FEBRUARY 1965 UT= 10

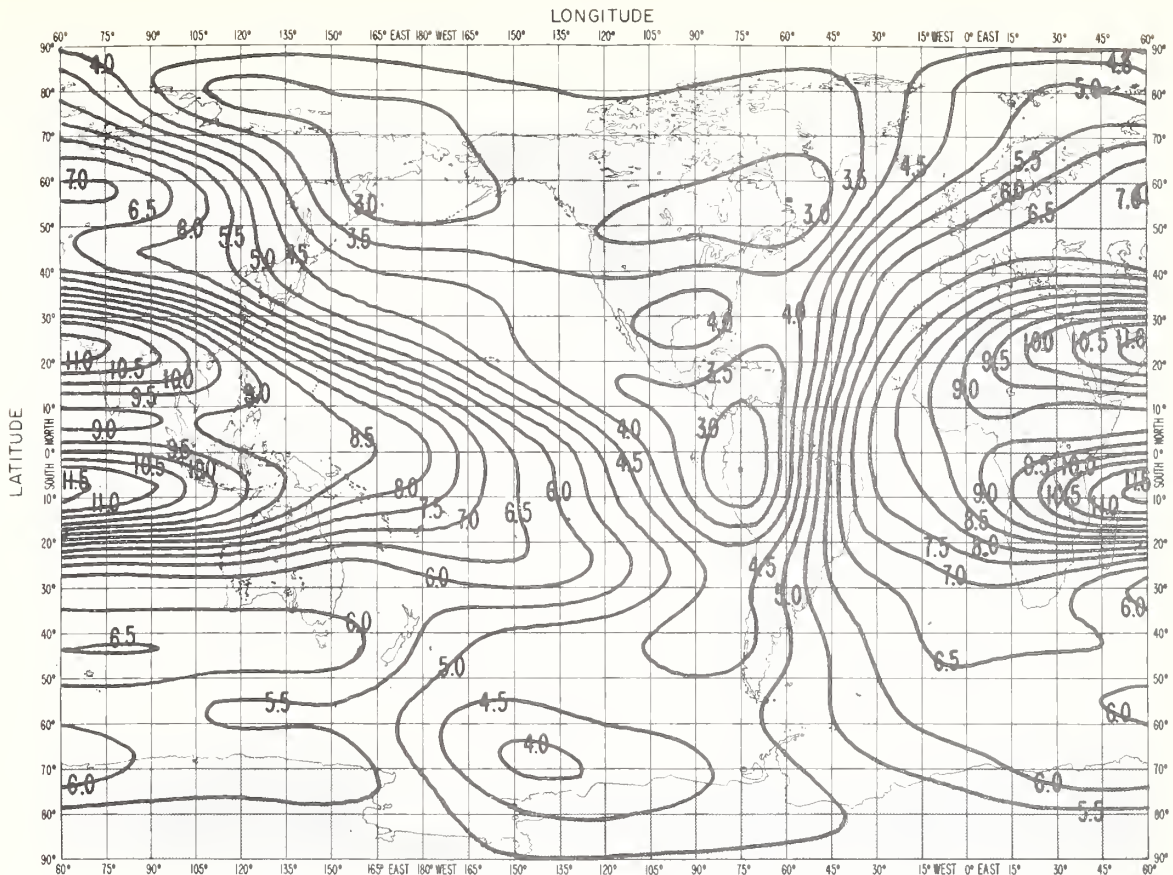


FIG. 6A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

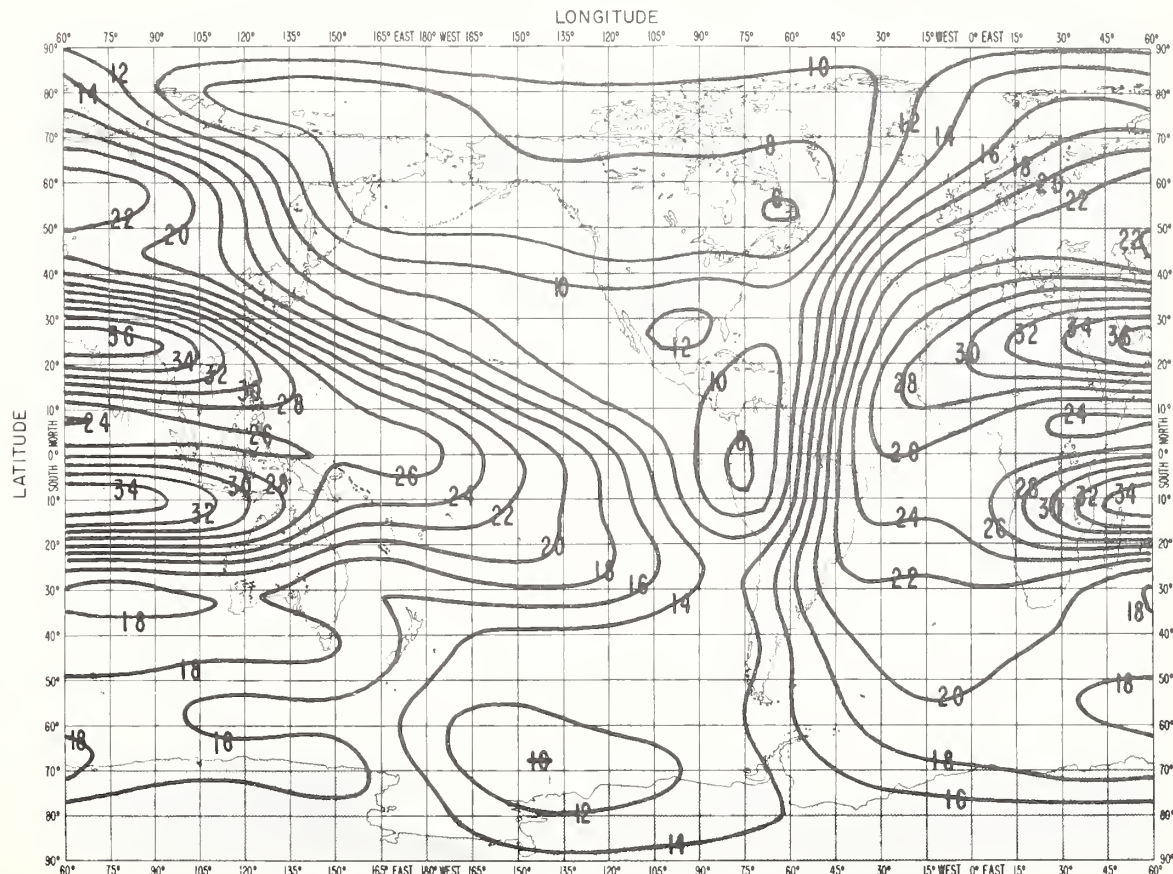


FIG. 6B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)



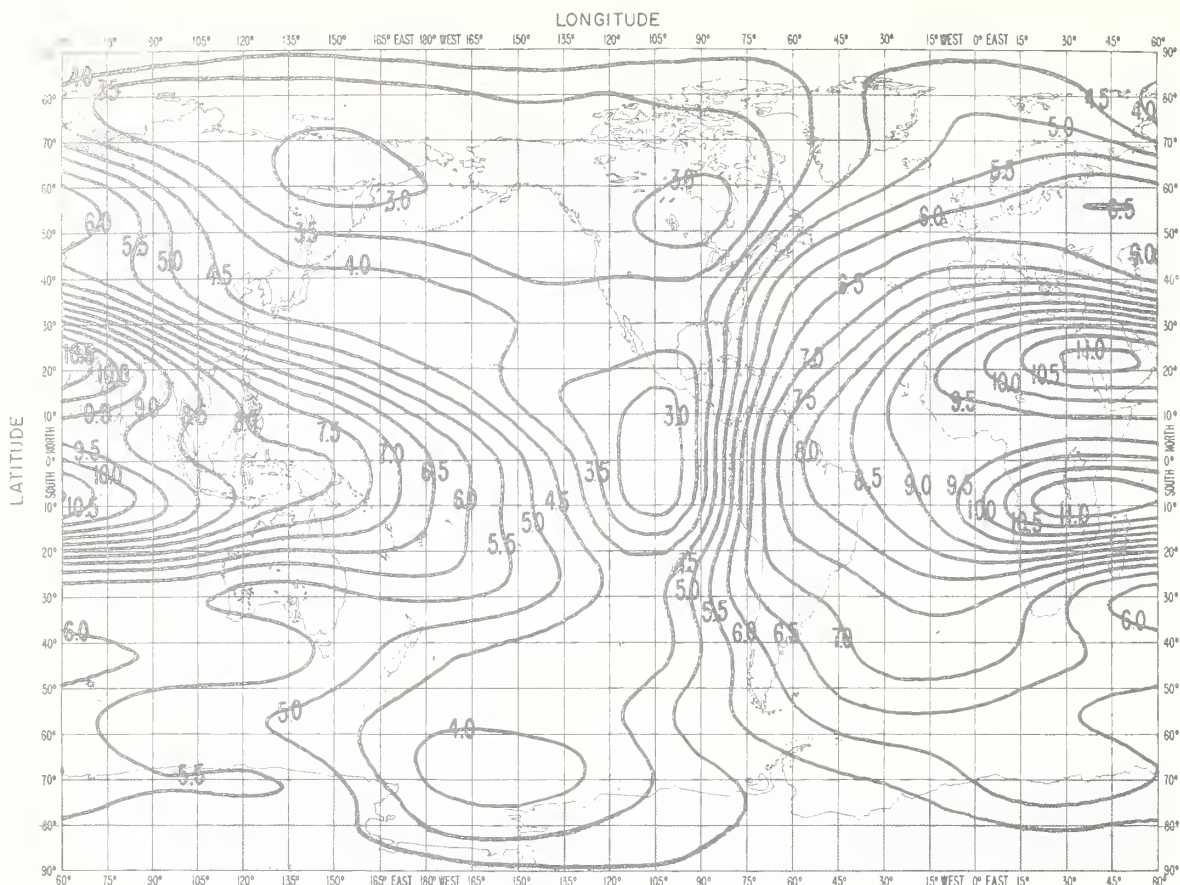


FIG. 7A. PREDICTED MEDIAN MUF(0)F2 (Mc/s)

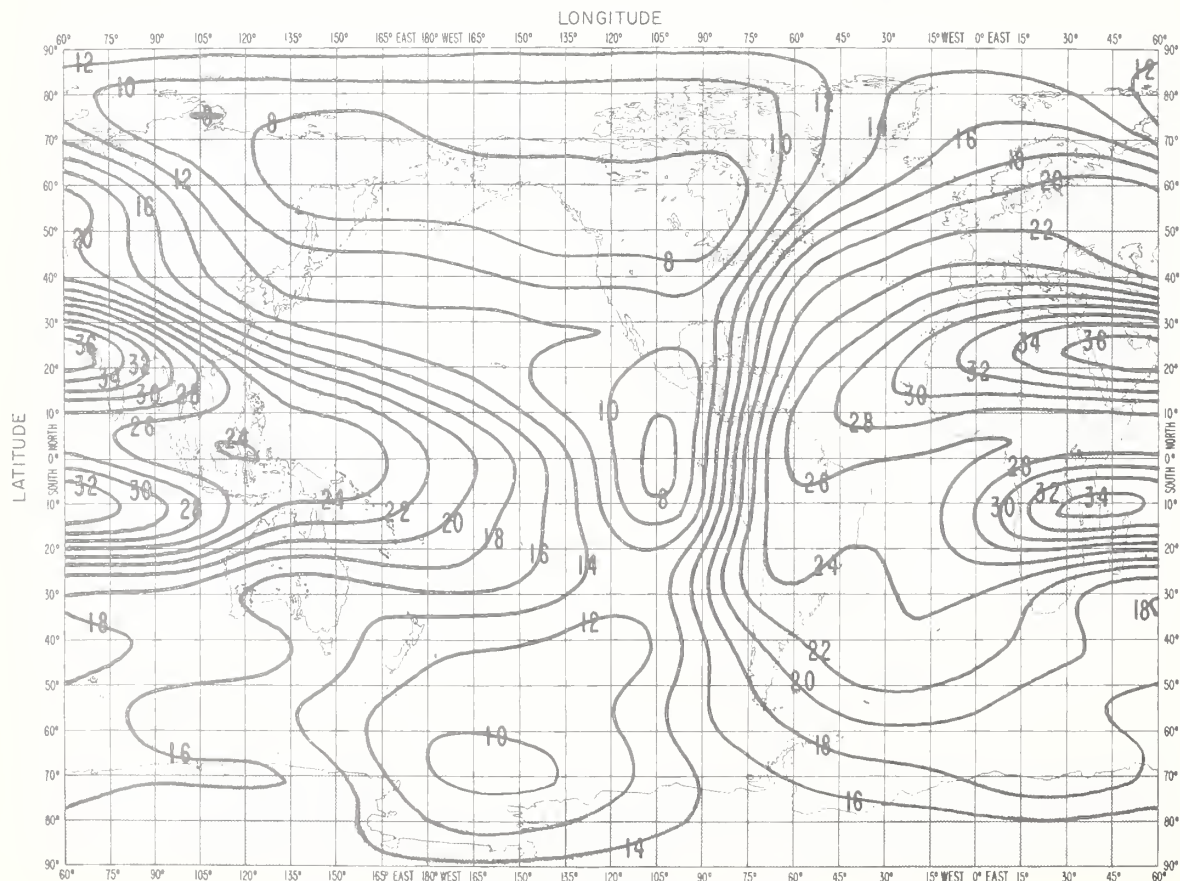
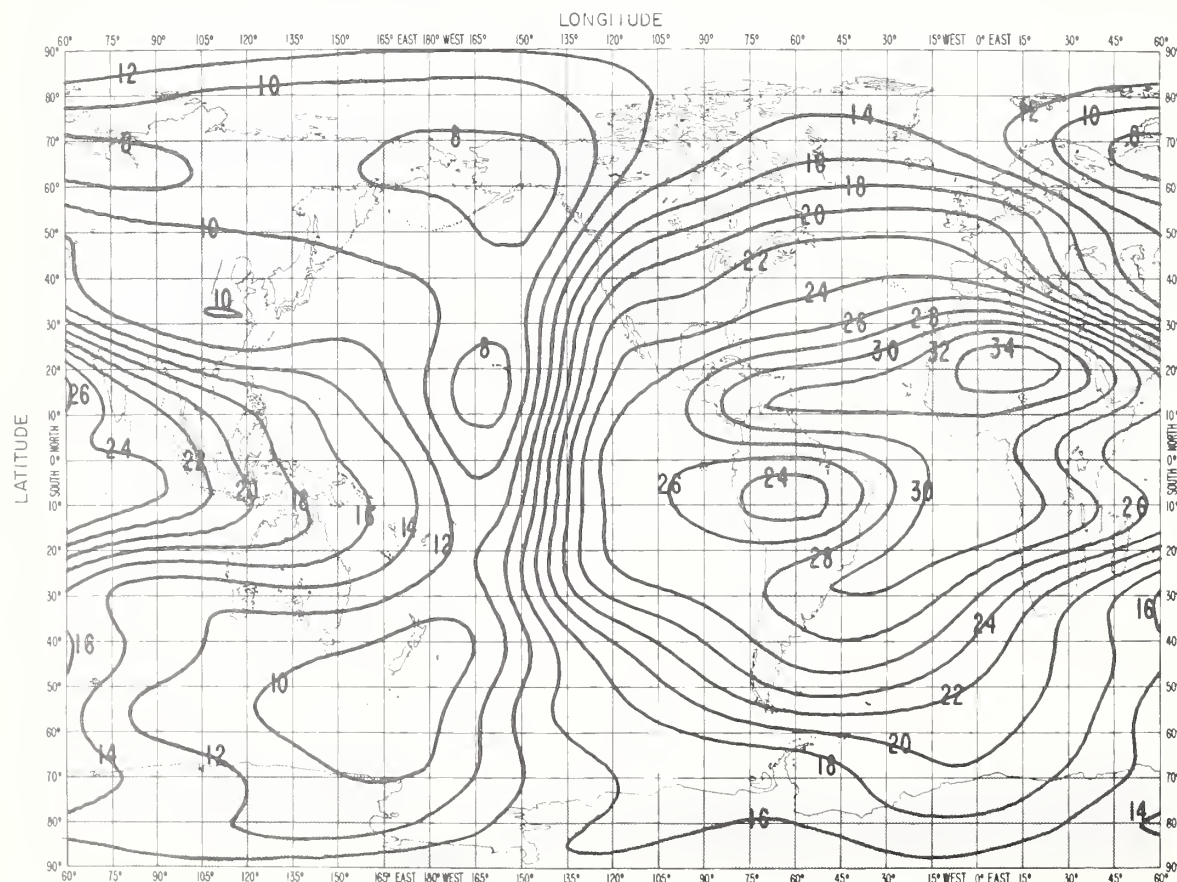
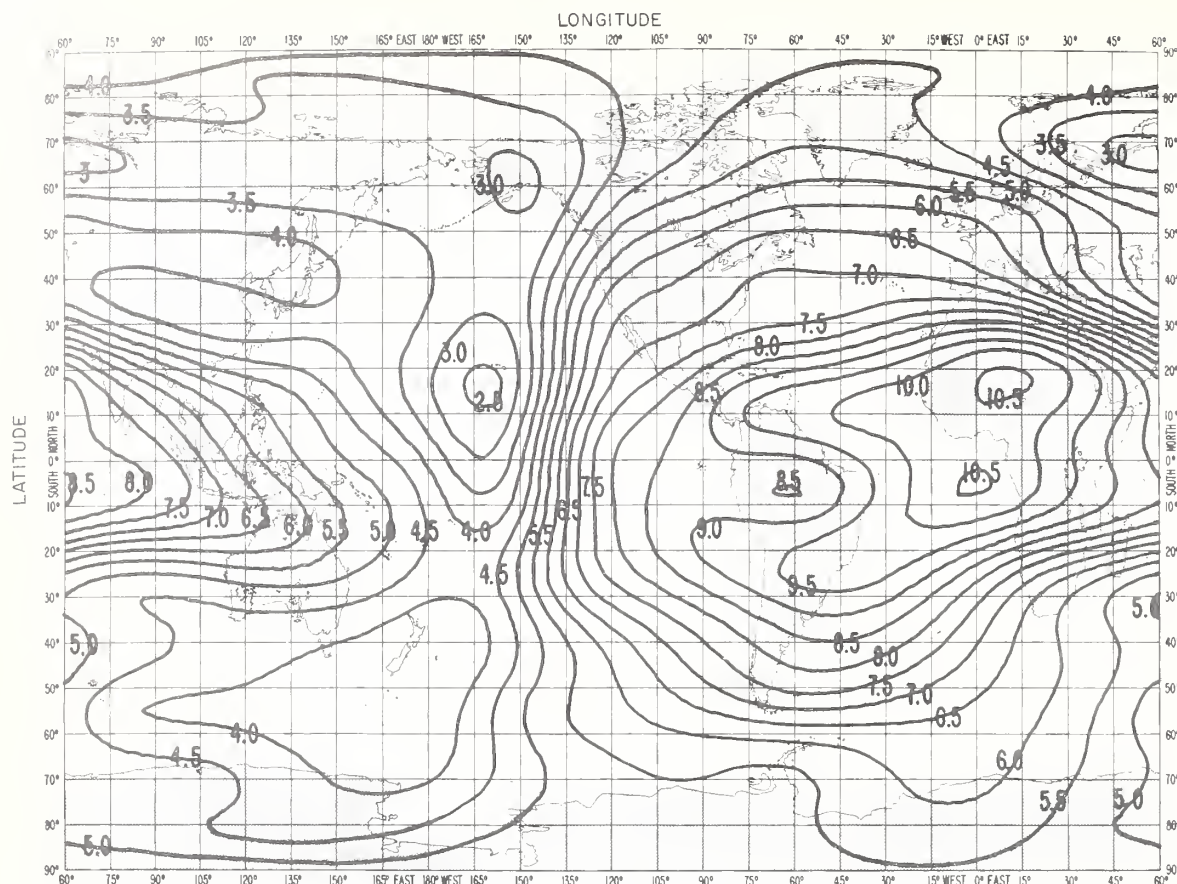


FIG. 7B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

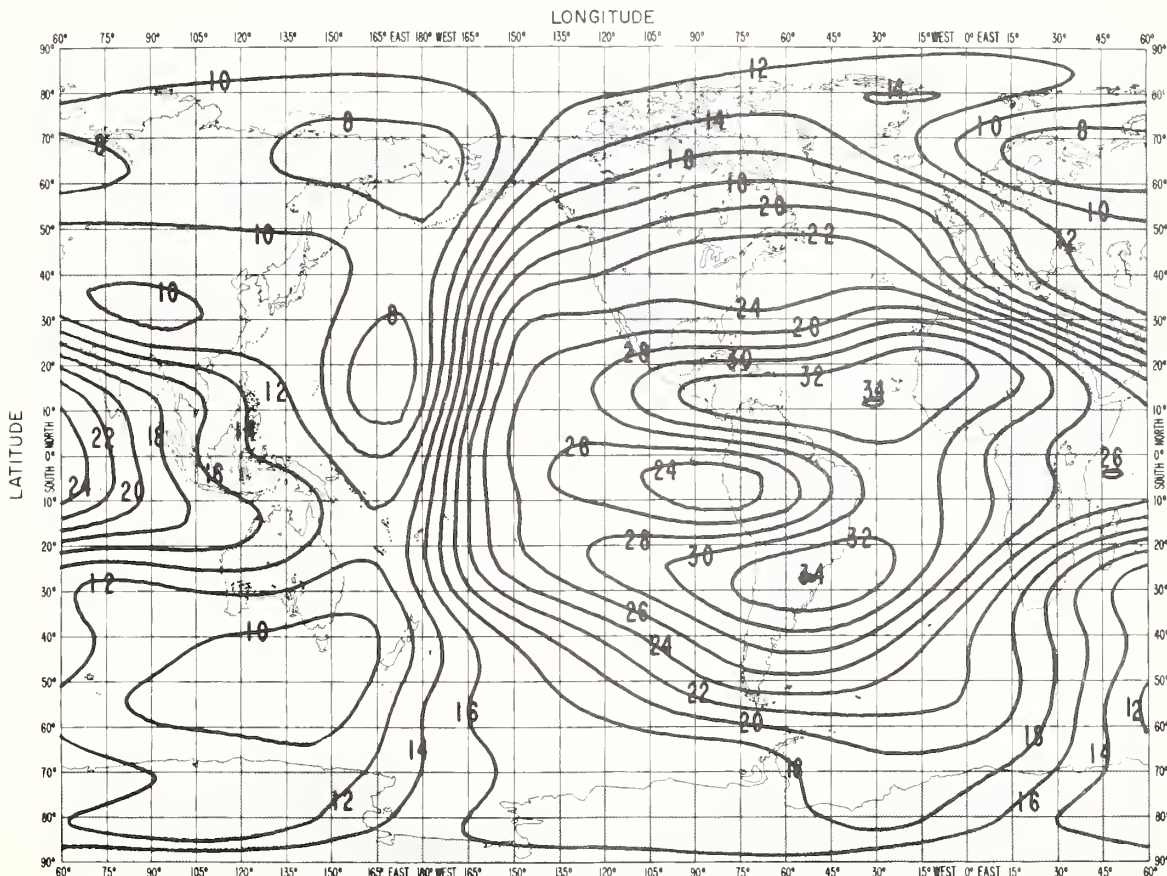
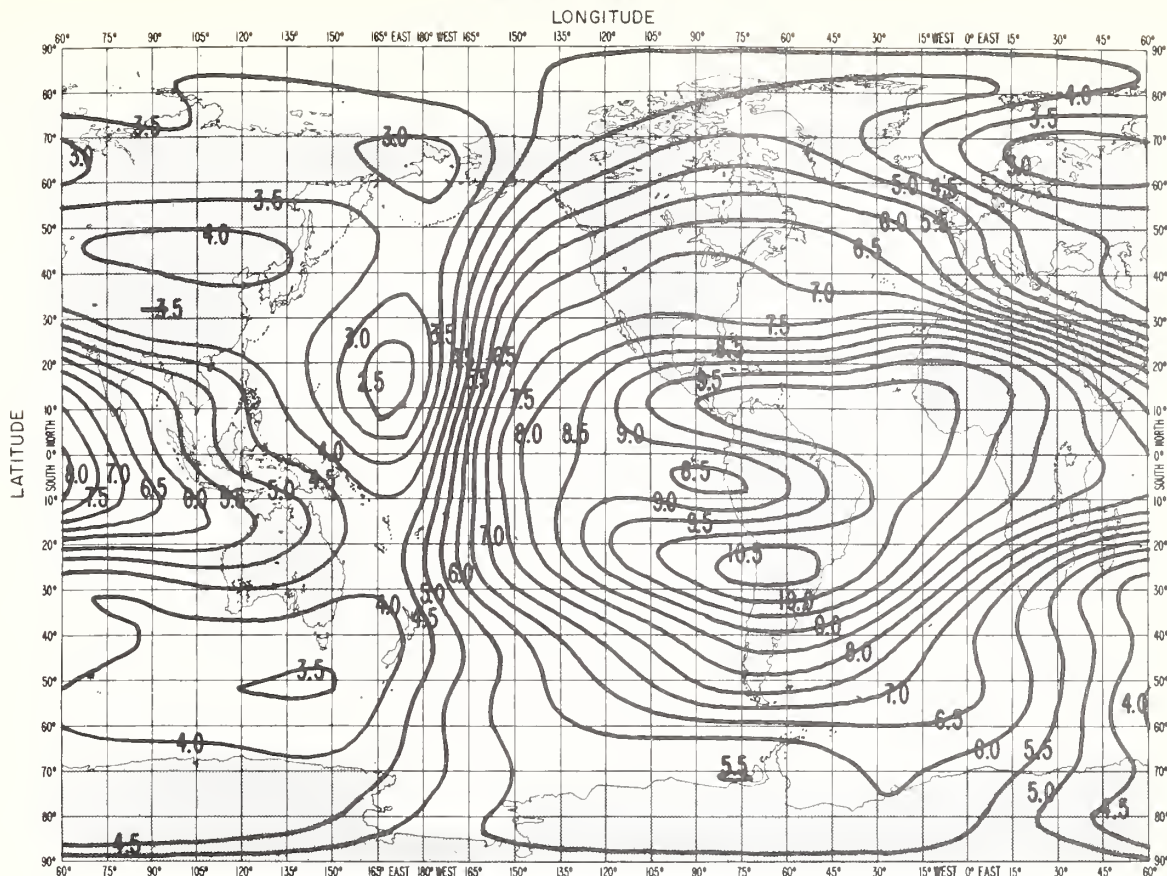




FEBRUARY 1965 UT=16









FEBRUARY 1965 UT=20

LONGITUDE

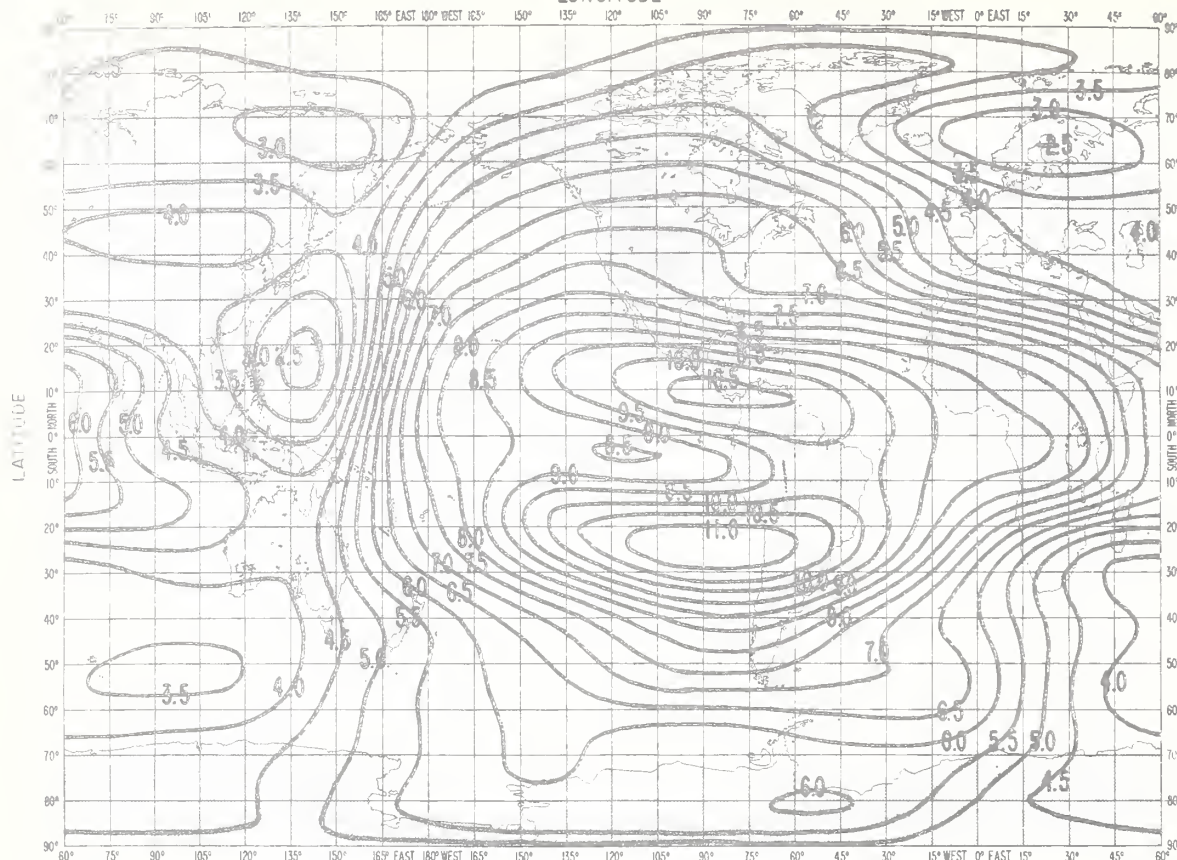


FIG. 11A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

LONGITUDE

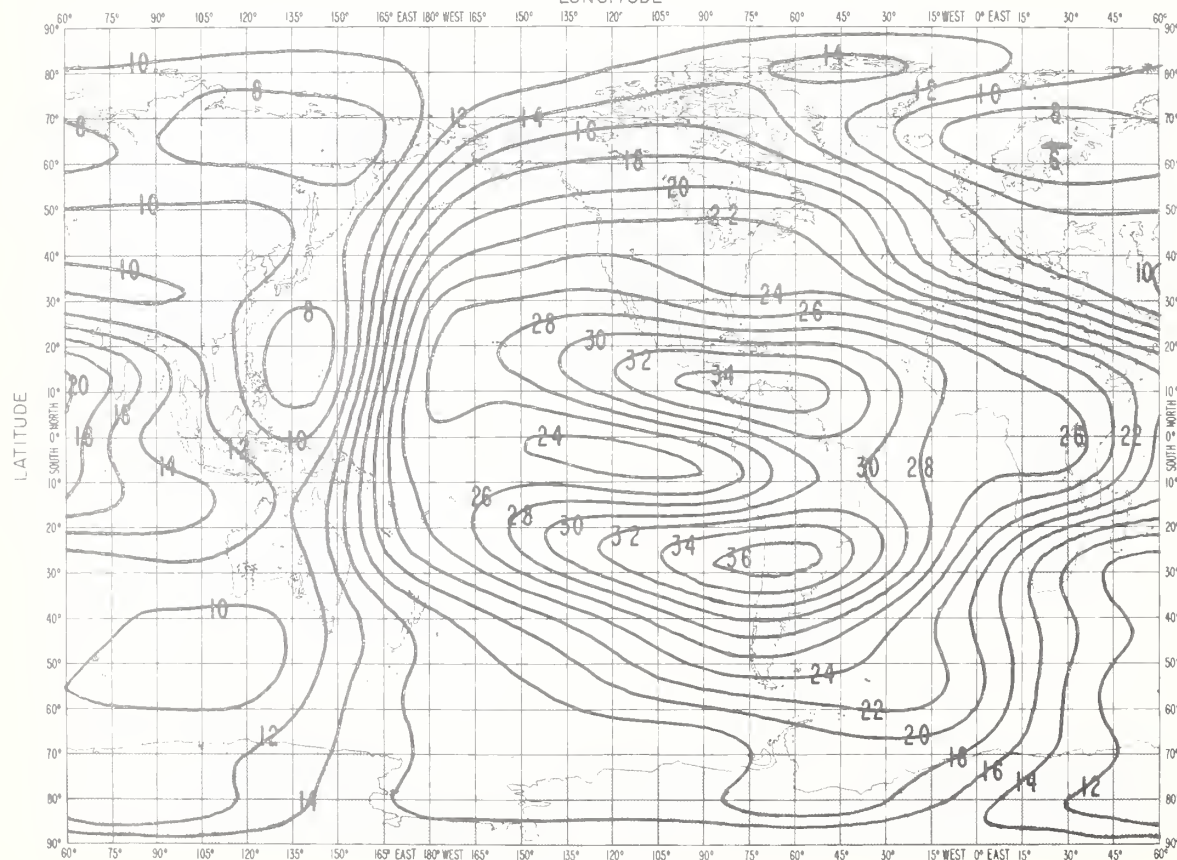
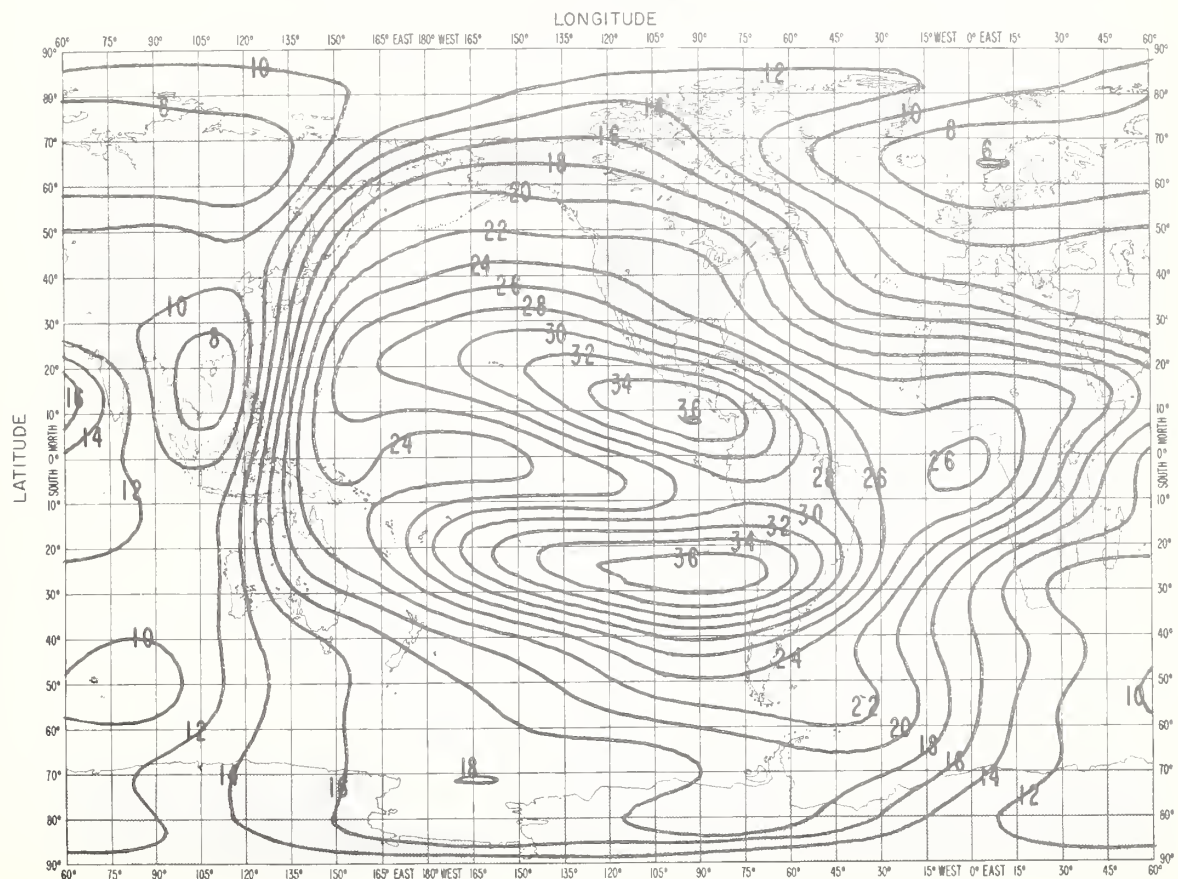
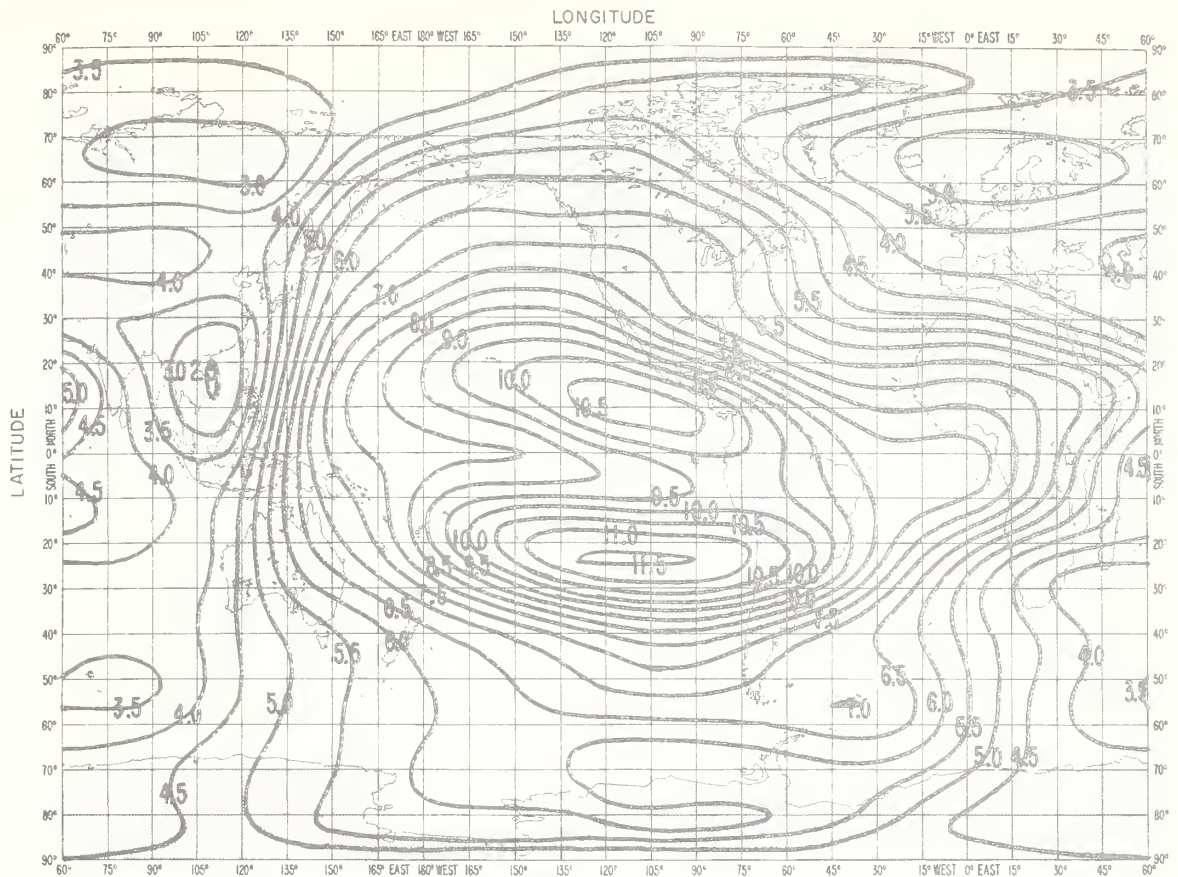


FIG. 11B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

FEBRUARY 1965 UT=22





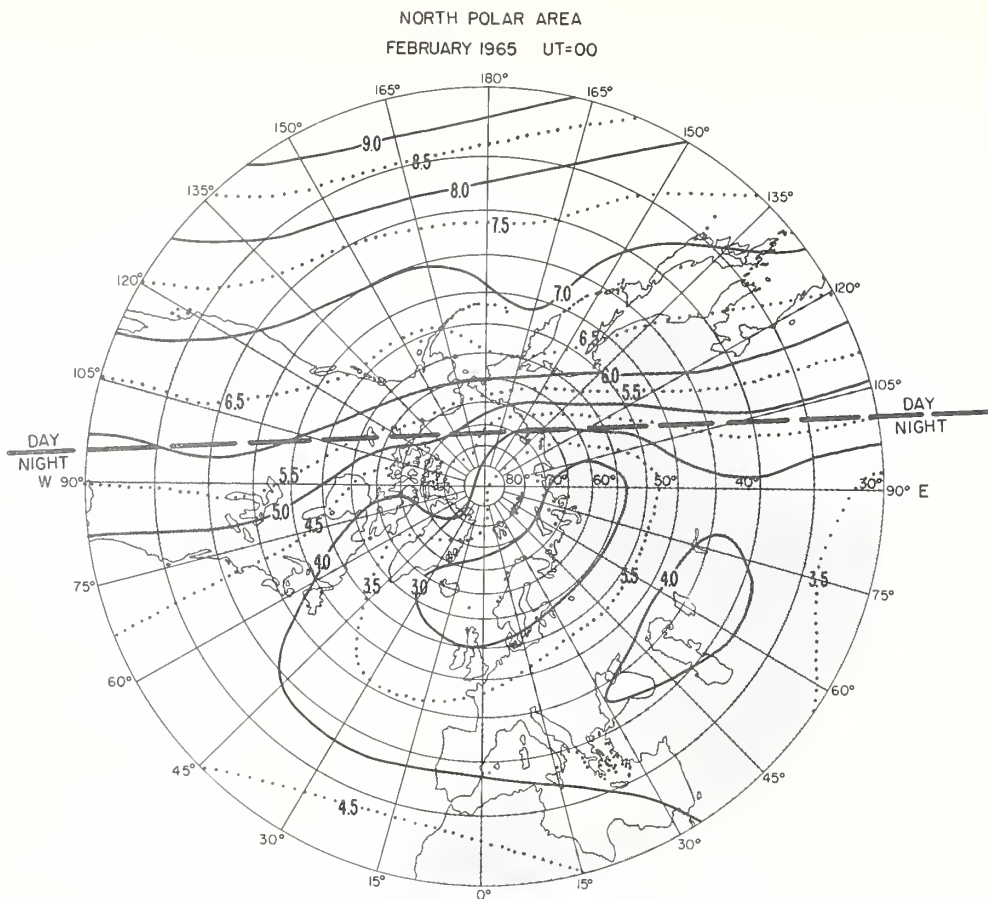


FIG.13A. PREDICTED MEDIAN MUF (ZERO)F2 (Mc/s)

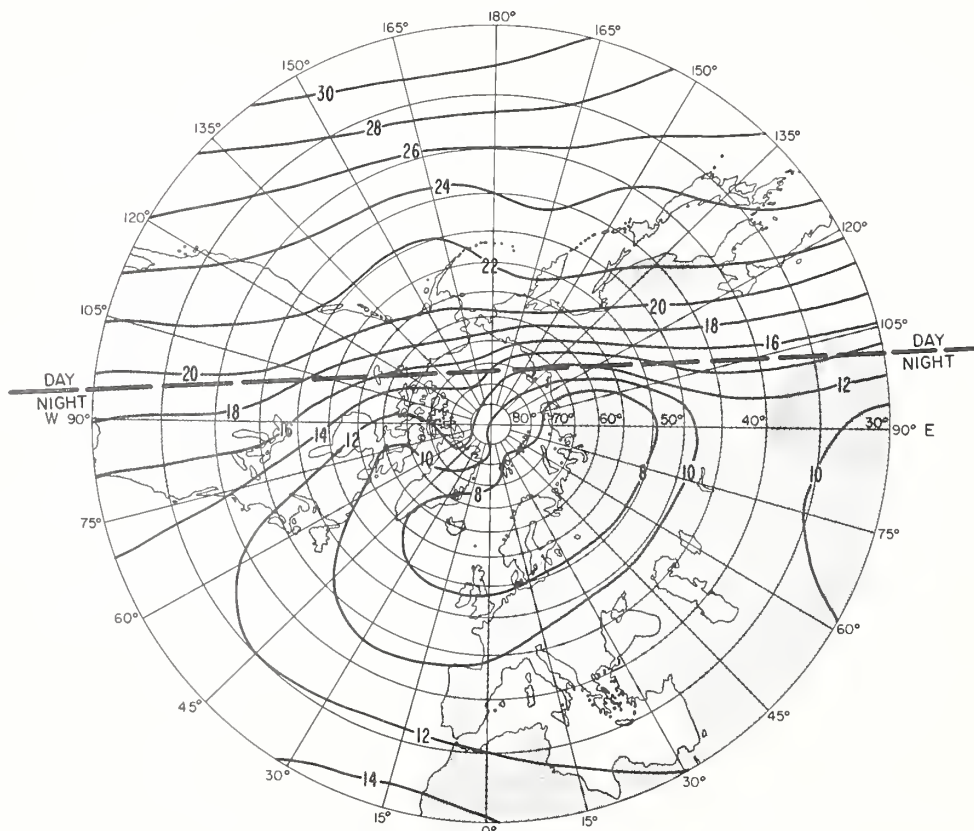
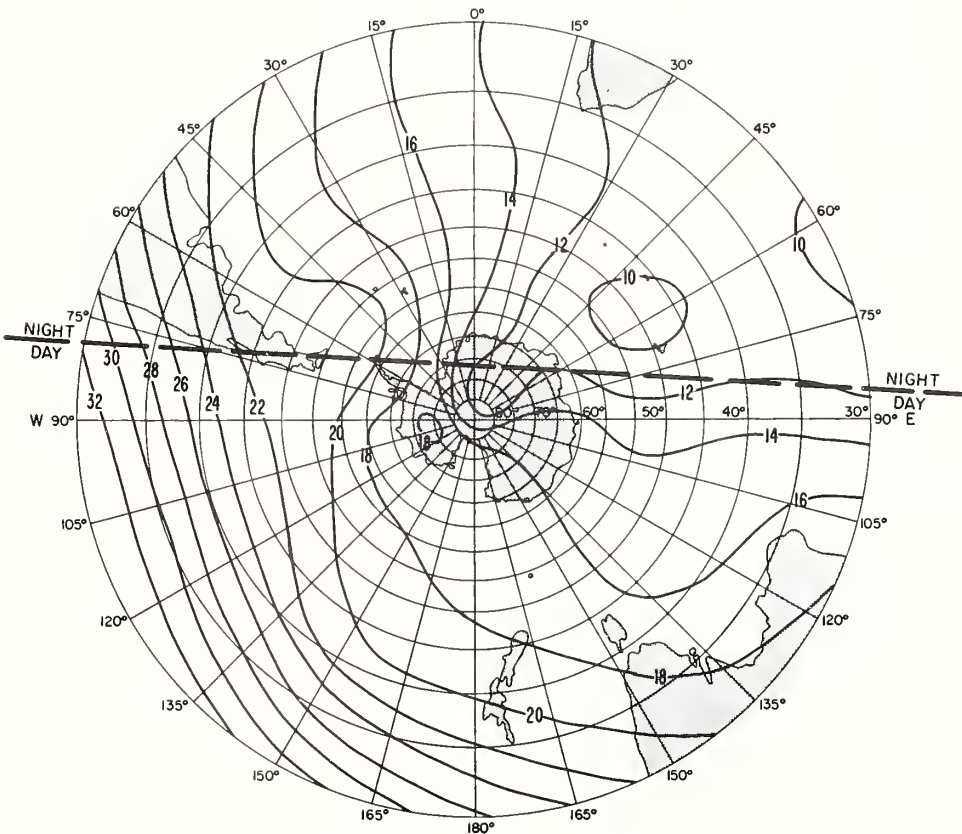
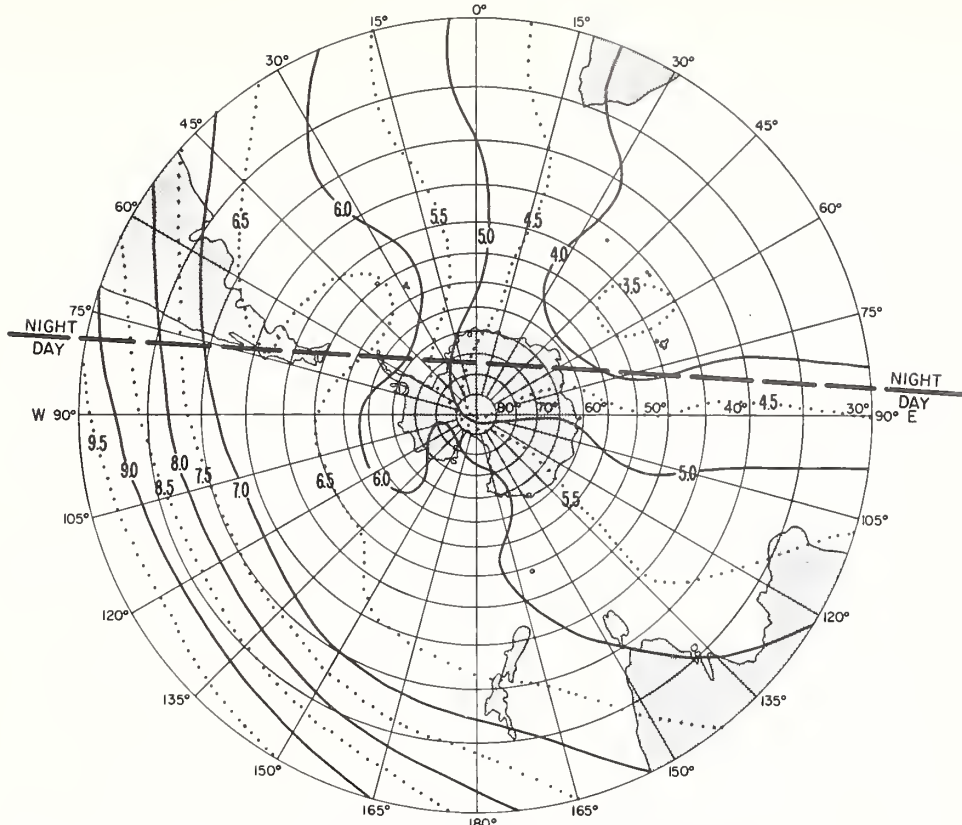


FIG.13B. PREDICTED MEDIAN MUF (4000)F2 (Mc/s)



SOUTH POLAR AREA  
FEBRUARY 1965 UT=00



NORTH POLAR AREA  
FEBRUARY 1965 UT= 12

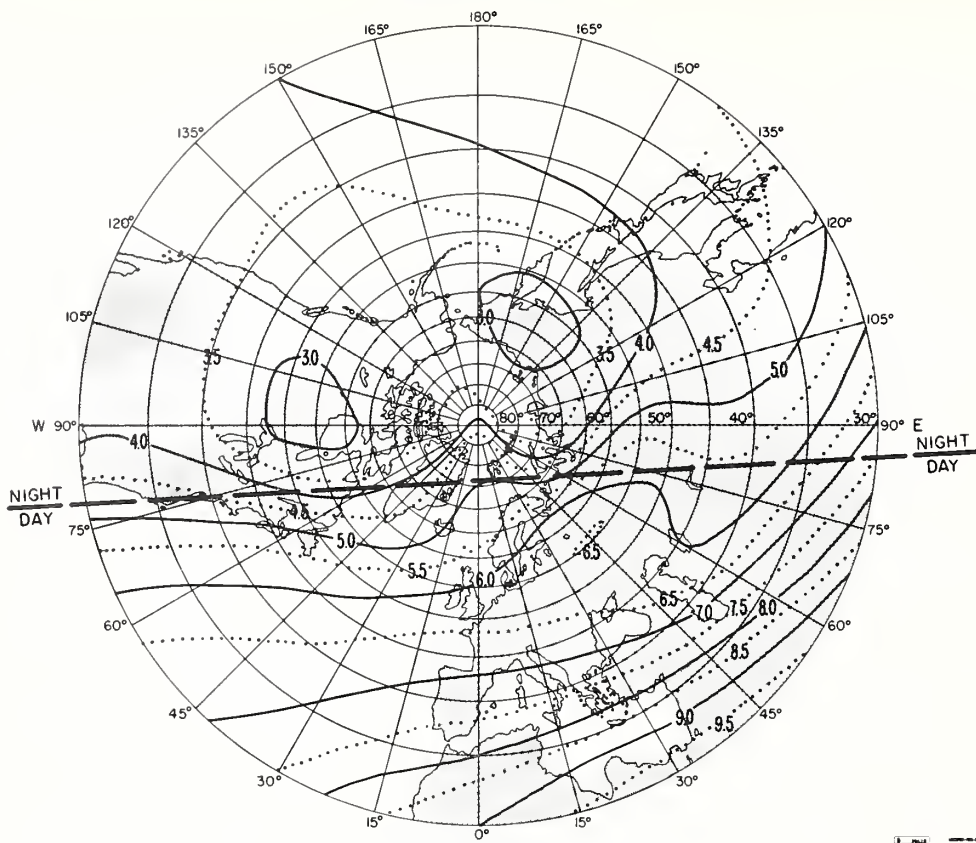


FIG.15A. PREDICTED MEDIAN MUF (ZERO)F2 (Mc/s)

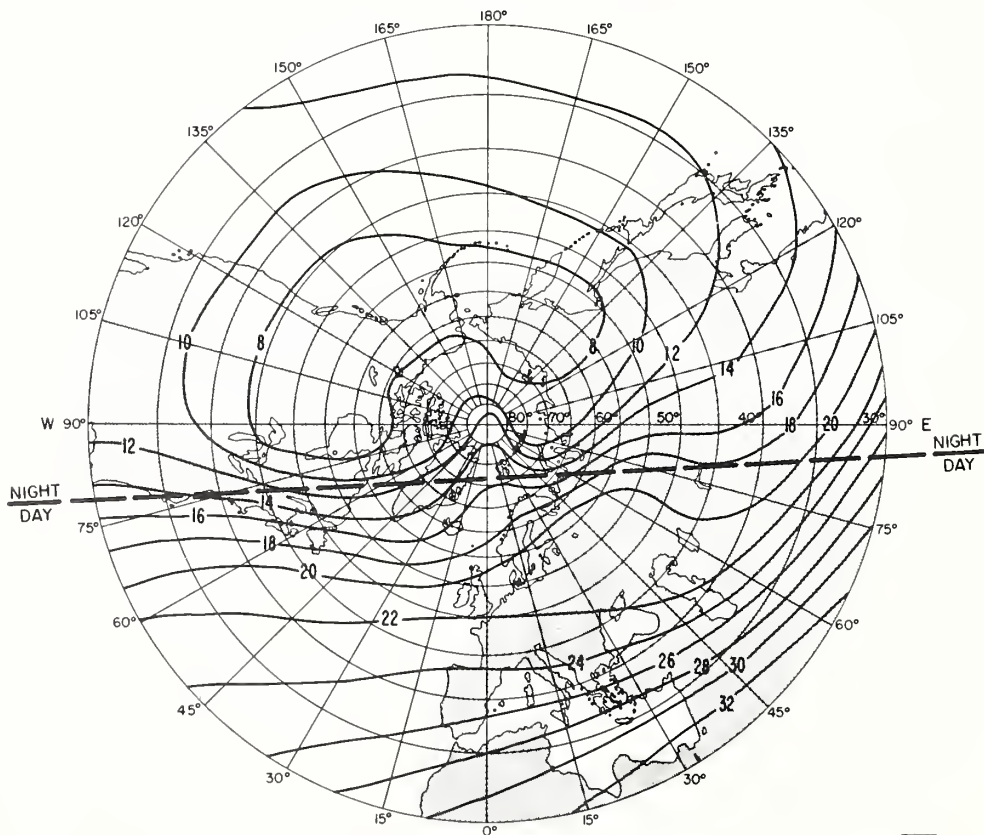


FIG.15B. PREDICTED MEDIAN MUF (4000)F2 (Mc/s)



SOUTH POLAR AREA  
FEBRUARY 1965 UT=12

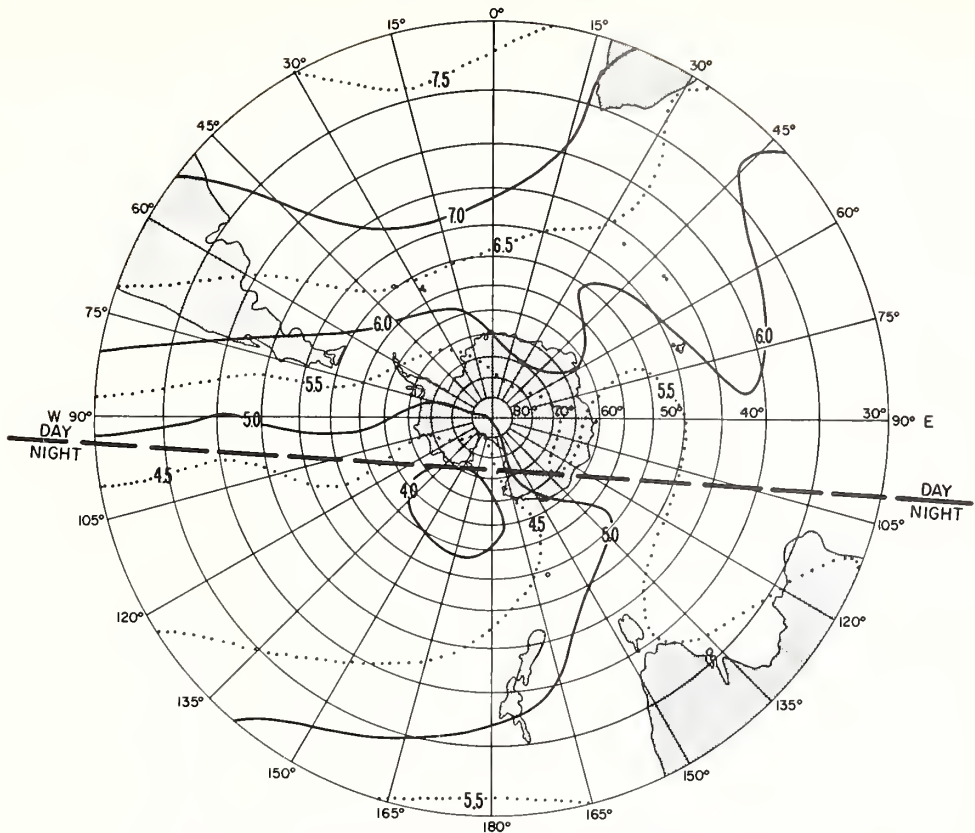


FIG.16A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

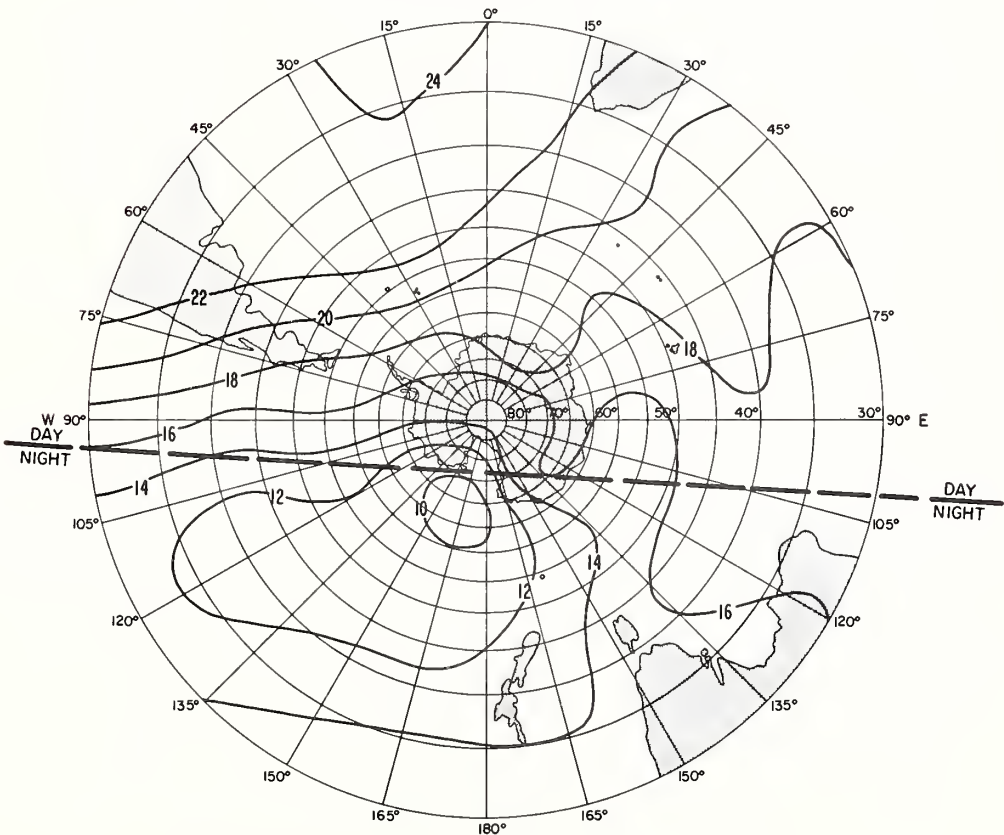


FIG.16B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

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WASHINGTON, D. C., 20301, 1 November 1964

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NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320-50.